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MATTHEWS
FULL AUTOMATIC
LIGHTING

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CCA



Interest in world events is awakened and ambition moves in the electrically lighted home.

MATTHEWS FULL AUTOMATIC LIGHTING

Light



WHEN the world began there was light. Through the centuries our sun, with myriads of stars which are the suns of other vast solar systems, has given us the glory of our universe. From that great source comes also the power and energy from which we create what we know as artificial or transformed light—the most magnificent inventive accomplishment of the age.

For the past century men have delved into the hidden mysteries of electrical science.

Manufacturing engineers have expended vast sums of money in factory equipment and in skilled labor for construction of light and power plants which can be quickly and inexpensively installed and sold at a price within easy reach of those whose experience has taught the value of wise expenditures.

The successful owner of an estate, the scientific farmer, the dairyman, shares with the suburban householder the benefits of electric power in its application to electric stoves, heaters, vacuum cleaners and electric fans—sanitary and comfort-giving.

The Matthews Engineering Company accepts the responsibility of its pioneer experiment and achievement in this vast field of endeavor. Today the specially designed Matthews Plants, embodying advanced engineering



Electric light insures a clean kitchen



The magic of the electric vacuum cleaner makes cleaning easy



practice, are founded upon the sound value of experience and proved accomplishment.

Out of the soil comes the food to feed the world. So is it that the country home is not only the soul of our national life, but of our civilization as well.

So much that has a vital bearing upon our existence has to do with country life. To the land which produces belongs the credit achieved by any race of people depending upon it.

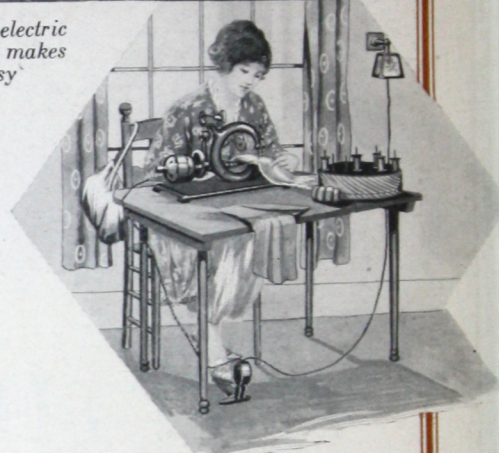
In the early days of pioneers, homes

were necessarily frugal and it took a generation of struggle to attain even meager comforts. To-day many are the beautiful homes with which our country abounds.

In the early days men struggled and women worked, not unmindful of, but inured to hardships and privations which had to be lived through, because the country was young and farms had to be laid out and lands tilled.

So the earlier generations had only primitive tastes and few pleasures. All has changed, thanks to the great development of invention and manufacture, that have produced machinery which has raised farming from drudgery to a science.

Where formerly men had to



It is a pleasure to make dresses or do bits of sewing when all you have to do with the motor-driven machine is guide it, requiring no effort



The housework is easier when electric power does the washing and wrings the clothes

The woman who has used an electric flat-iron never will do without one. No lost steps back and forth to the hot kitchen stove; the room is cool while the iron is hot



Young mothers find comfort in the electric warming pad. The electrically heated milk bottle prevents the chills of the old-fashioned ways



The electric toaster and coffee percolator are indispensable to a pleasant breakfast on the farm

confine their day's labor to the coming up and going down of the sun, much of the "chores" and work about the house had to be done by candle light—long after darkness had descended. Reading was a pleasure denied, yet those early struggles for education found opportunity for books, gathered at the fireside or about the flickering light of a tallow dip, and strained eyesight was a heritage handed down to those whose lives were lived before crude oil and kerosene lamps found their way into the home.

So it came about that women had added to their household duties the cleaning of lamps and the trimming of wicks, which was cheerfully gone through with day after day—year after year.

In the last few years electricity has come to bless us—to save our health, reduce the strain upon eyesight, and in many ways lighten our burdens in our forward struggle toward higher education and learning.

Now the porch and hall are lighted as well as the living-room, dining-room, library and bedchambers. Even by the touch of a button is there light in some dark closet, and the older method of sweeping and dusting has given way to the vacuum cleaner, while a small motor is readily attached to a sewing machine. Even the washing is done by electricity and the electric flat-iron has come as a boon to housewives whose cleanliness is next to godliness.



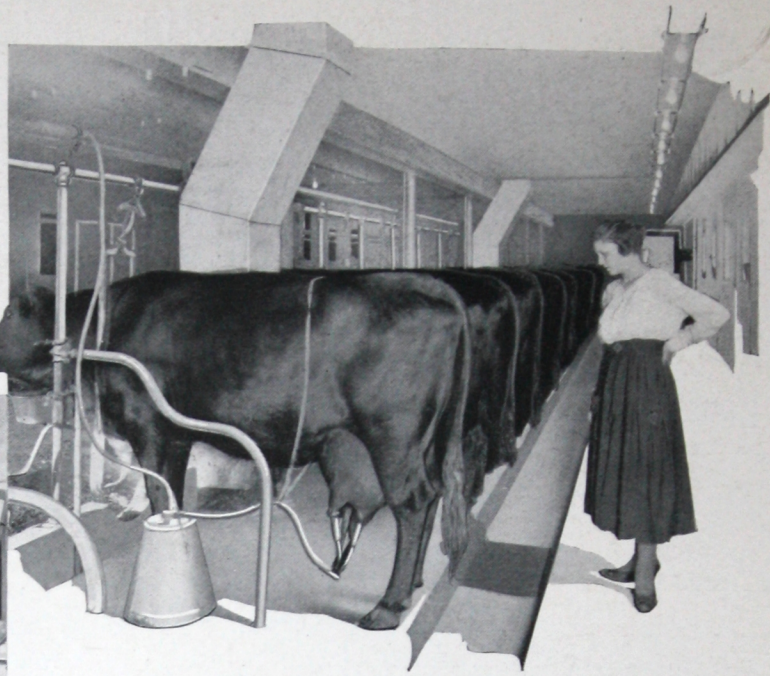
In those homes where children come to bless, not only is there electric light at the touch, but the heating pad or bed-warmer serves its need for the invalid. The toaster and percolator on the dining-room table make possible the breakfast without the necessity of a hot

Safe illumination during the holidays

Matthews Light and Matthews Power are always ready, sanitary and safe

Matthews Light and Power on the dairy farm make work easier and get things done more quickly

Matthews Power has taken the drudgery out of dairying for hundreds of large dairy farms

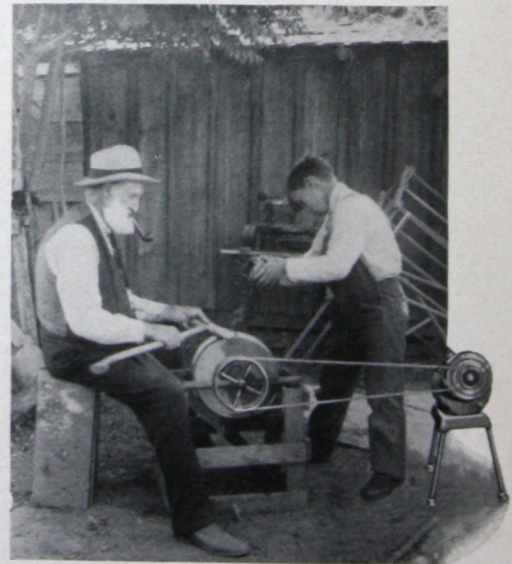


wood fire—a boon in summer when the hot days come and one would be sheltered from the heat outside, fanned by a gentle breeze from some electric fan conveniently placed. Then at night, the sleeping-porch, screened in summer, built-in windows in winter, has its electric light and becomes another auxiliary room. The children's room and the Christ-

mas tree are lighted by electric lights, removing the danger from upset lamps spilling inflammable oil. The disagreeable odor of kerosene disappears with electric light.

The electric light is the "watch through the night," instantly on or off at will, and fires are now unknown so far as they result from the careless use of matches, and over-heated stoves. Thus we relate briefly only a few of the many benefits of electric lighting.

The Matthews Engineering Company, starting over nine years ago, began its experiments for the manufacture of electric light and power equipment. Since that time many improvements and perfection in manufacture have been accomplished. When others failed, Matthews Engineers persisted. The result has been most satisfactory; Matthews Full-Automatic Light and Power Plants having come into their own, being accepted and recognized for the simplicity of their design, the accuracy of their construction and their proven efficiency.



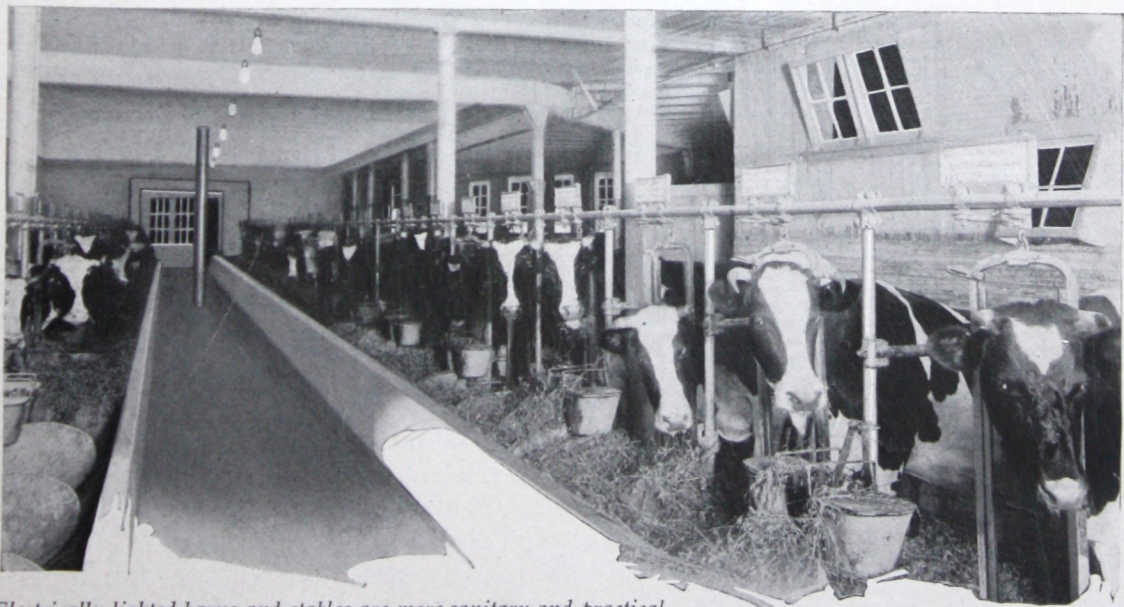
THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE



Electric Lighting and Power on the Farm

FROM 1900 to 1910, the value of farm property more than doubled. In the last ten years the value of farm property has increased approximately 10 billions of dollars. Specialized farming has found favor, as is shown by the increase in dairymen and live-stock producers. There has been evidence for the most part of a prideful, upward impulse to improve the construction of barns and arrange for the installation of sanitary improvements such as electric light and power make possible. The dairyman finds it to his profit to take good care of his herd, giving special attention to housing and feeding. Mixed herds have made way for better bred stock which is more profitable.

In order to succeed, the farmer and his family are reading more and thinking on a higher plane, applying business principles to more efficient methods. In consequence the family demands in the country home the same conveniences which are found in modern city homes; they buy good furniture, they wear good clothes and ride in good automobiles. Electricity lights the way to their homes, and house and barns are equipped with every convenience for light and power application. As one rides through the country, he measures by outward evidences the advance in prosperity.



Electrically lighted barns and stables are more sanitary and practical

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE



The Harbor Front of San Juan, Porto Rico

Mother ship with submarine chasers, converted to peace-time pursuits and equipped by the U. S. Government for peace-times with Matthews Full-Automatic 6 K. W. lighting units. These are used in the Customs Service of Porto Rico. Improvements and progress follow the U. S. Army and when the Marines went to Porto Rico, they introduced there the Matthews Full-Automatic Lighting Plants.



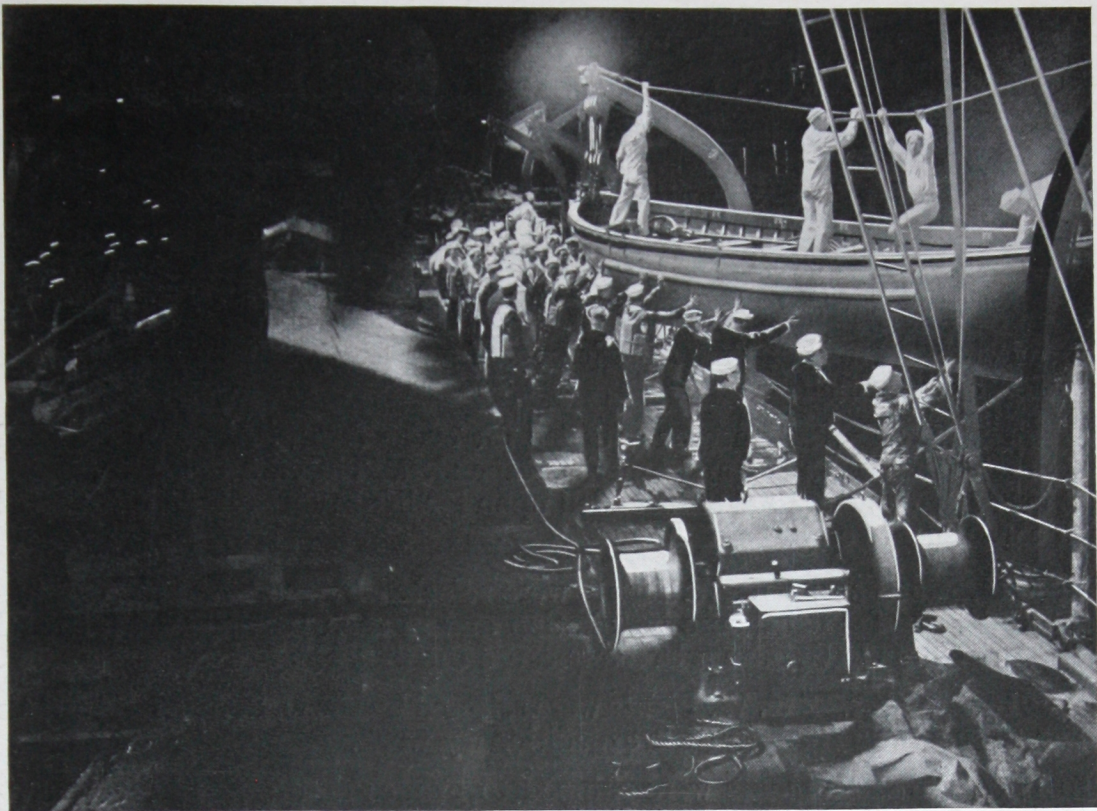
Mother ship with converted submarine chasers equipped with Matthews Full-Automatic Light and Power Plants, as used in the Customs Service

Matthews Full-Automatic Lighting as Employed by the United States Government

THE problem of transporting men and munitions to France during the war required extraordinary precaution and unusual care. All boats that were operated by the United States Government, whether engaged in patrol work, police duty, or in mine laying, as well as in the larger work of transporting men and munitions, had to have special provision made for auxiliary lighting, so that when any accident happened to put out of commission the ship's main lighting plant, light could be automatically and instantly supplied. To that end, our Government selected the Matthews Full-Automatic Lighting System which was conveniently installed, usually on an upper deck, so that it was independent of and separate from the main



Customs Patrol equipped with Matthews Full-Automatic unit



Matthews auxiliary automatic lighting of davits and passages, as used on shipboard to prevent panic and save life in event of ship's main system momentarily failing, whether in peace or war times. 146 lives were lost in panic in darkness on a Spanish steamer January 6, 1921, a few hundred feet from shore. It was not equipped with automatic auxiliary lighting for emergencies.

ship-lighting system. When ships were torpedoed, the vital part of the ship, engines and boiler room, was the target and it not infrequently happened that the lights on the boat were extinguished, rendering all passages dark.

In such an emergency no human hand was needed to start the auxiliary Matthews Lighting Plant. The Full-Automatic control acted positively and surely—starting the engine and supplying instantly the light so urgently required. In hundreds of tests the Full-Automatic self-starting control feature proved to have the dependable qualities the Government wanted, in recognition of which the Matthews Lighting Plant was adopted as standard on the new transports built by the Emergency Fleet Corporation, and introduced by the exigencies

of war to the government officials. The same plants controlled by the Matthews full-automatic starting and stopping methods have been adopted on many new boats built since the Armistice.

Matthews Full-Automatic Light Plants furnished the power for huge search-lights used in the war zones.



Official wireless operator, using Matthews power on board army transport



Launching the first transport equipped with Matthews Full-Automatic Lighting Plant for emergency lighting of davits and deck passages

Governments Select Matthews Plants

It is a compliment to Matthews Engineering Company to have Matthews Electric Plants selected by the Government's most skilled engineers.

It rarely happens that America and American people and institutions are tried to their limit.

The World War emergency called for every farm, every machine and every man to do his utmost and America responded. The emergency demanded that every machine used and depended upon for life-saving should be selected with consummate care.

¶ In 1914, Matthews 1 K. W. plants were selected by the Treasury Department Engineers for lighthouse installation and in each year since, additional Matthews plants have been selected because the first plant saved many lives.

¶ In 1916, Matthews 2 K. W. Plants were selected by the U. S. Army Engineers Corps and used by them in their expeditionary work.

¶ In 1917, the same plants were shipped to France and again the "old reliables" rendered excellent service.

¶ In 1917, additional 2 K. W. plants were selected by the Director-General of Railways in France, and these plants made possible some of the most stupendous feats of the war.

¶ In 1917, Matthews 1 K. W. Plants were selected by various departments on the front in service in France, Italy, Belgium and Russia and not one ever failed in performance of its duty.



Matthews plants supplied the current for artillery control and for search-lights used with these anti-aircraft guns. The preparation of large docks and landing places in France was carried on under American Army engineers, day and night, the way lighted by Matthews plants, and at night back of the lines repairs went on unceasingly in army repair depots lighted and motor driven from Matthews engine-dynamo sets. The same sets are used today in farm homes and factories everywhere

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE



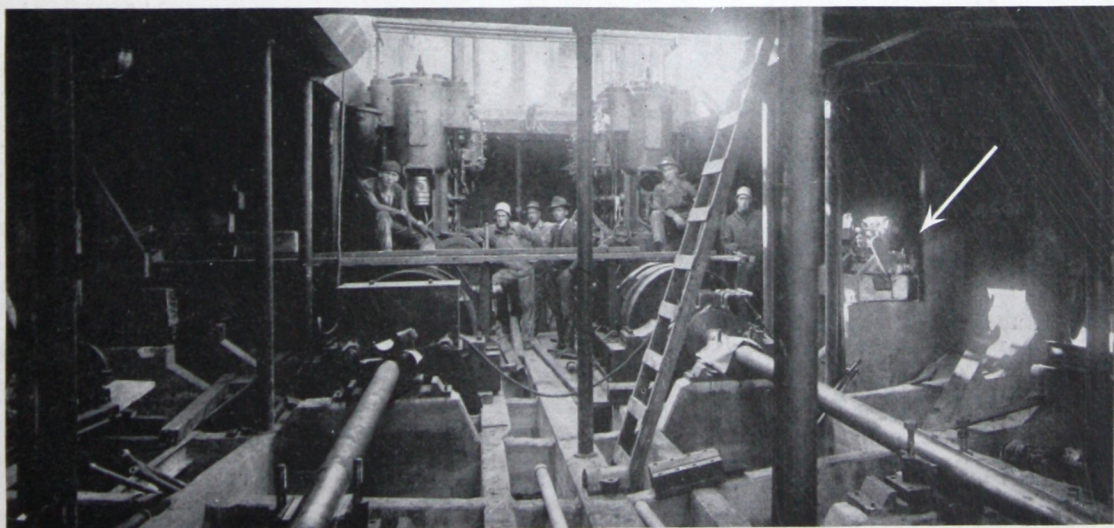
The first concrete boats built by the U. S. Government in process and finished ready for acceptance by Uncle Sam

¶ In 1917, Matthews 6 K. W. Plants were selected by the Emergency Fleet Corporation of the U. S. Government for the most important service in the Navy where dependability was paramount—the emergency operation of the wireless apparatus on the transport ships.

¶ In 1918, Matthews 10 K. W. and 15 K. W. Plants were selected by the U. S. Army Ordnance Department for their military operations overseas.

¶ In 1918, Matthews 6. K. W. and 15 K. W. Plants were selected by the U. S. Navy for installation on concrete ships and 10 K. W. Plants by the U. S. Army Signal Corps for extremely important aeroplane work.

Matthews plants of all sizes were selected by other departments of the Government, by Quartermaster-Generals' Engineers, by Engineers of the Bureau of Yards and Docks to repair ships night and day, and by Engineers of the Forestry Division.

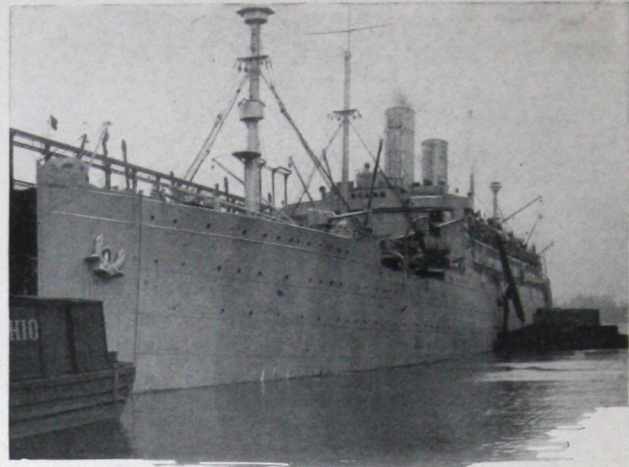


Engine room of the above boats being finished. Matthews plant seen installed on right-hand side of the picture. These boats have been in continuous government service for three years and the current has never failed once in any boat in the entire time, the officers state

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE



U. S. Army repair depot Matthews powered and lighted



U. S. Army transport equipped with Matthews Full Automatic Lighting sets for emergency and safety

The American farmer, at home, busily engaged in the vital labor of producing food—the real sinews of war—found his time and energy conserved and his results multiplied by the help of Matthews electric light and power.

The entire equipment of Matthews factories and personnel was gladly offered to the Government. Designing, testing, tool making, manufacturing and the uttermost loyal effort of every hand, brain and machine in our control were placed at its unqualified disposal.

Truly, “Matthews men and Matthews machines have served!”

The unusual ability of our own engineers with the expert co-operation of the best talent the great emergency made available, backed by immense experience and ample capital assure the commercial user of securing in Matthews plants as near perfection as human ingenuity can produce.

EDWARD MC SHANE WAITS
PRESIDENT



Cor. Wanted By	To be FILED
REC	APR 28 1920
TO PRES.	TO SECY.

April 26 - 20.

Matthews Eng. Co.,
Sandusky, Ohio.

Dear Sir:

While I was in the U. S. Army in France, I had charge of the electrical dept. in one of the large advance depots and had two of your generating sets along with several other makes and larger sizes.

I ran one of your Matthews sets 21 days and nights with but one stop and that was due to some dirt getting under the needle valve to the carburetor. I changed needle valves and was going in ten minutes. I do not know just how long the engine would have run but my idea was to give it a good test. The average load was about 5 kilowatts but at the end of 21 days and nights I thought it had done its bit so well, I switched.

None of the other engines gave such real satisfaction as the Matthews did. Hoping this may interest you, I remain

Very truly yours,

R. W. McBride
Master Mechanic

Matthews *Full-Automatic* Control

AN electric plant is satisfactory and a pleasure only when it gives light and power under conditions that approach nearest to actual city or central station service. Matthews Full-Automatic is positively the nearest approach to this service.

"You never need to go near a Matthews Full-Automatic Plant to start it or to stop it."

That is a partial definition of the term "Matthews Full-Automatic." In addition to automatically starting and stopping themselves, Matthews Full-Automatic Plants automatically keep the battery charged, and automatically prevent it from being overloaded or run down or entirely discharged.

Most all lighting plants made today are started by hand by closing a switch or pressing a lever. The generator then acts as a motor and cranks the engine. This is not Automatic Starting; by some it is called semi-automatic; strictly speaking, it is not even that. Any operation which calls for the exercise of intelligent direction, is not, mechanically speaking, automatic, much less full-automatic.

It Never Forgets. It Acts!

The Electrical Brain of a Matthews *Full-Automatic* Light and Power Plant is more dependable and accurate than any man's memory. It never forgets. It acts. It never fails to perform all the functions necessary to supply light and power when needed. In addition to meeting every demand instantly and supplying that demand constantly, it knows when it must store electric energy for future needs. When the plant's immediate work is done it rests, and it does not begin its work (operation) again until the stored supply of electric energy is below normal. This knowing *when* the plant must work, *how much work* it must do to meet the demand, knowing *when it is accomplished*, and *when the plant may rest again*, is the quality of brain peculiar to the Matthews *Full-Automatic* Light and Power Plants. It is the only plant that *knows* and *acts* accordingly. Even when a Matthews *Full-Automatic* Light and Power Plant is *resting*, its brain, with tireless energy, *thinks*. It is alive, ever watchful, ever ready. It acts with definite care and precision. It is patient and thorough, to the point of exactness. It gives just what is required, no less, no more. There is no mystery in its acts, every one of which it registers on the face of the *Full-Automatic* control board. But it requires no assistance from any power outside of itself. It thinks and works whether you are in the field or at home, awake or asleep, mindful always of the needs you have of it. That is why it is called the Matthews *Full-Automatic* Light and Power Plant.

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE

What *Full-Automatic* Control Does

ACTUAL experience has shown that the Matthews Full-Automatic plant does not start and stop 99% of the time but 100% of the time. On actual tests these plants have been started and stopped by throwing on and off lights or power machines 3500 times without a single failure, or the same as once a day for ten years.

The Matthews Full-Automatic Plant Starts When 15% of Battery Charge is Used up

Matthews Full-Automatic Plant starts automatically when 15% of the battery current has been used; and continues running until battery is fully charged. The engine will then stop while the lights are burning. Once the battery is charged, your light comes from the battery only until 15% has been used, when plant starts running again. Under this system the plant in the average home runs about an hour per day, automatically starting and stopping.

Plant Starts When too Heavy a Load for the Battery is Thrown on

An overload (for model JR battery) consists of 24 or more lights or the equivalent. An electric iron is an overload for a storage battery, so would be twelve lights and a vacuum cleaner, or a power motor, all running at once. In either case the Matthews plant starts itself and supplies the current from the generator instead of from the battery. Plant will carry the "overload" and charge battery, but will not stop so long as 24 lamps (or equivalent) are being used.

Emergency Cut-Out

The switchboard automatically causes the motor to crank the engine to start it under the conditions mentioned above, but, if for any reason, such as ignition trouble, the engine should fail to start, the motor stops cranking within a fixed limit and current waste is not possible. Starting is facilitated by the automatic "choker" on the carburetor electrically controlled.

Plant Stops When Battery is Fully Charged

The Matthews Full-Automatic Plant stops the engine automatically when the battery is fully charged, providing there is no overload on the plant at the time. If there be an overload, the engine continues running, taking care of the overload, but does not overcharge the battery.

Battery Cut-Out

If at any time the storage battery should become nearly discharged, the circuit-breaker on the switchboard breaks the current between the battery and the line. This function is very seldom needed but absolutely prevents injury to the battery by over-discharging. The Matthews Full-Automatic Plant does not wait for the lamps to get dim before it automatically protects the battery.

If you want to start the plant and see how it operates you can do so at any time by pressing the test button on the face of the switchboard.

The small switch near the test button is for stopping the plant if you want to stop it for testing purposes.

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE

Simplicity Is the Key Note of the Matthews Full Automatic Control

The instrument that starts your Matthews full-automatic Light and Power Plant when a flat iron is used or when an overload is turned on is called an Overload Relay. A relay is a very simple instrument. Hundreds of thousands are made and used every year for various electrical equipment. There are several in every telegraph office. The application of an electrical Relay is universal and every high-school boy understands the principle and many uses of the instrument.

The application of a Relay to a lighting plant for starting automatically when heavy loads are thrown on, without attention from the owner, is a patented Matthews design.

In order to show how simple it really is, this drawing is given and can be readily understood. This Relay has one-half the number of parts an ordinary electric door bell has and is much simpler in operation.

Overload Relay

This overload relay mechanism is so simple that it never needs adjustment and never gets out of order.

It consists of a coil of heavy copper wire (W) wrapped around a fibre core (C). Inside of the core is the iron plunger (P) which rests on a brass piece (G). This plunger carries a brass guide stem and when it travels upwards, the upper end comes in contact with the piece of spring steel at S. The only moving part of the mechanism is this iron plunger (P). The six-sided threaded bolt at the top (E) is made of soft iron. You know that means that it is easily magnetized, which is equally true of the iron plunger; you realize that when they are both magnetized they will attract one another; that is, the plunger (P) will jump up against the part (E) and stay there, and when magnetism is reduced will drop away.

You know if you wrap a coil of wire around a piece of soft iron and pass electric current through the wire that this piece of iron will pick up tacks, nails, etc., and that when you reduce the amount of current to a certain point the nails or tacks will drop off.

All of the load or current used by the lights, flat-irons, motors, etc., passes through this heavy wire (W), which we show cut away at places so you can see the inside of the 'core.

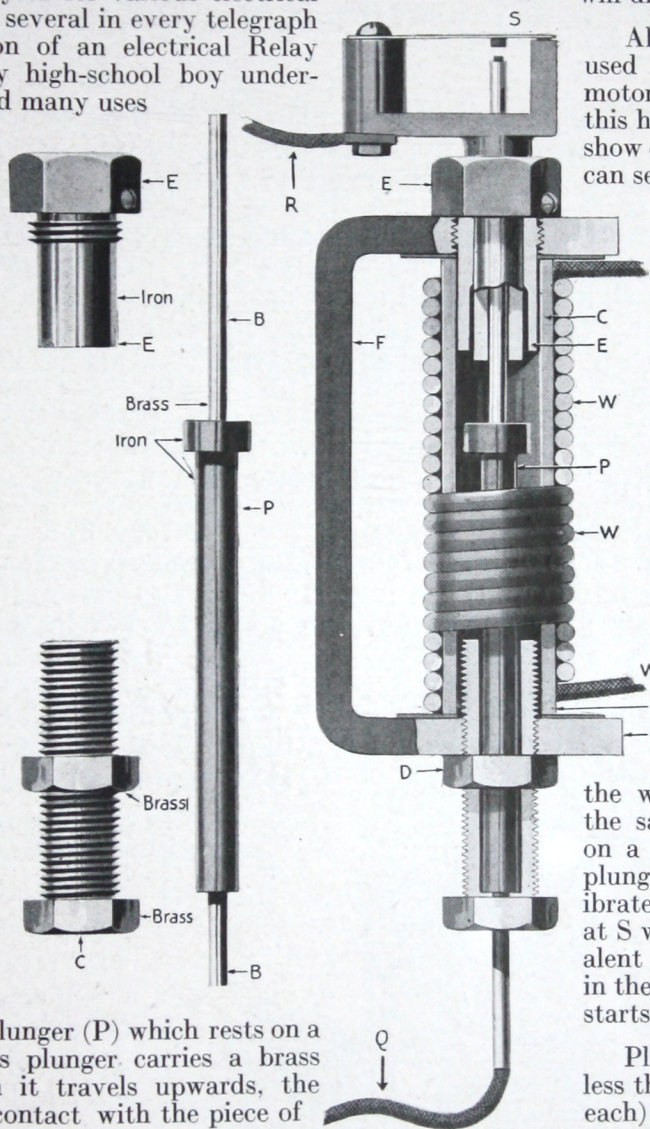
When sufficient current to amount to an overload (24 lamps or more) on the battery passes through this wire, the plunger and the pole piece (E) are magnetized. The plunger moves towards the pole piece (E) just as naturally as the tack is attracted to the magnet. The two tungsten points at S come together and complete a path for current which flows in from the wire marked Q across the spring down the brass guide piece and out through

the wire marked R. This is the same as closing a switch on a hand started plant; the plunger is so adjusted or calibrated that it makes contact at S when 16 amperes (equivalent to 24 lamps) are flowing in the line—and then the plant starts.

Plant continues to run until less than 15 lamps (20 watts each) are burning, then plant automatically stops, except if the battery be partially charged, the plant will continue running until battery is fully charged.

One of the First Batteries

The battery shipped with one of the first Matthews Full-Automatic Light and Power Plants installed in the home of Henry Libben, Port Clinton, O., was still in use after seven years of continuous service.



This is the instrument that automatically and unfailingly starts the engine on the Full-automatic Light and Power Plant whenever a load in excess of 24 lights or 16 amperes is taken from the battery (load means amount of current)

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE

Owners' Comfort Studied and Supplied by Matthews *Full-Automatic* Control

To build a plant so practical as to arouse the owner's genuine respect, so reliable as to win his deepest confidence, has been the endeavor and the attainment of the Matthews factories in producing Model JR.

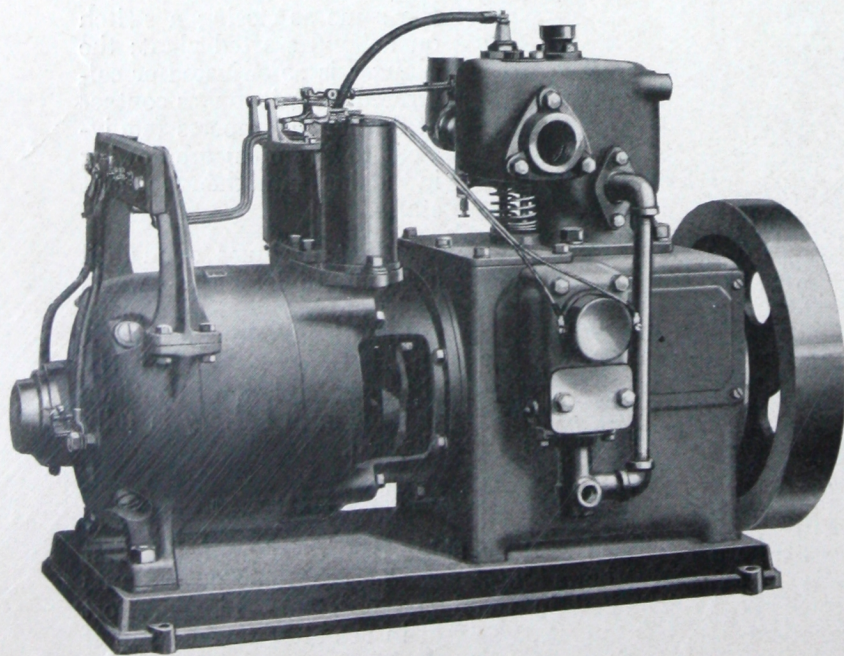
Quality predominates in Model JR because the problems of the farmer were faced with open minds by Matthews Engineers. It shows supremacy in all tests and has established its right to leadership.

The skill concentrated in the production of Model JR extends beyond the requirements of three or five years' use. The Matthews requirement is for a sturdy unit that will not fail under any power and light usage within its capacity for use by the second generation. This determination to have long life built into each unit is adhered to with conscientious fidelity by every man in the organization.

The story of Matthews One Kilowatt Full-Automatic generating units is the romance of a small and honest beginning nine years ago, enlivened by a policy of thoroughness.

It is the romance of improvement, most modern methods, the gathering together for a common purpose and good, of experts and specialists, new buildings, acres of floor space and the accumulation of splendid financial resources.

All this has been accomplished slowly, thoroughly and without waste or extravagance, that the owners of Matthews plants might derive unlimited satisfaction from the permanence of the Matthews institution.



Model JRM—Marine model for boats and special installations

Model JR will perpetuate the reputation of Matthews from one generation to another. This reputation precludes cheapening or any substituting for long-lived quality.

These plants contain only the finest grades of materials.

Fundamentally sound engineering principles are incorporated in the design and resourceful ripened experience guides the Matthews production of this wonderful unit.

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE

Low Operating Cost Is a Predominant Matthews Quality

The fit of perfected parts and the automatic system of control lead to economies of fuel consumption and wear which are not excelled anywhere by any other lighting plant builder. JR is powered for unlimited service.

Model JR offers unusually sound electric plant value.

Power and Long Life are the outstanding characteristics.

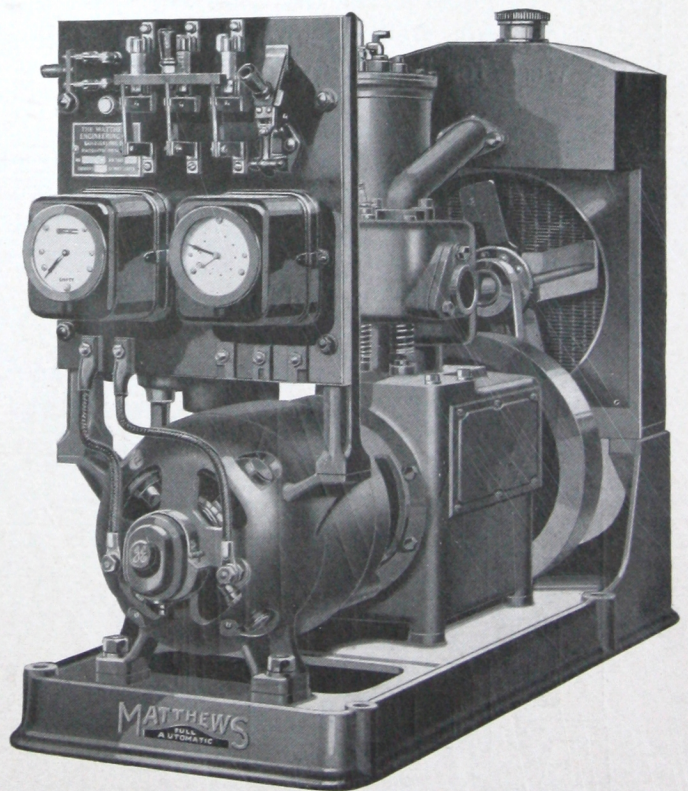
It meets requirements squarely and honestly for over a generation's use. Careful inspection and questioning of a hundred or a thousand Matthews users assures that outside of Matthews plants being automatic, Long life is the striking Matthews accomplishment.

Matthews design is right in the minutest detail. The engineering features of design represented by this model reflect the association of three years with government experts in Matthews shops, while building admiralty sets continuously day and night.

The standards set by these officers and developed by the Matthews home-owning mechanics has built a reputation for Matthews in every corner of the U. S. A., and the whole world.

Back of these Matthews Electric Plants is a complete metallurgical equipment with electric furnaces, forges and heat treating ovens. Matthews Engineering Laboratories carry on continuous operation tests. For years new units have been taken at random from stock and put on the day and night test for months of non-stop running.

Within three months of the introduction of the Model JR, 1 Kilowatt electric unit, the Matthews production facilities were seen to be inadequate to supply the increased demand this model created. 24,000 square feet of production space were recently added to the acres of space devoted to the exclusive production of the Full-Automatic Matthews Model JR. The demand has increased steadily.



Model JR, 1 K. W., Full-Automatic Light and Power Plant, 32 volts, 50 light rating on generator alone—supplied with large capacity storage battery

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE

Matthews *Full-Automatic* 32 Volt, 50 Light

A Most Practical and Popular Size

The Matthews Leader

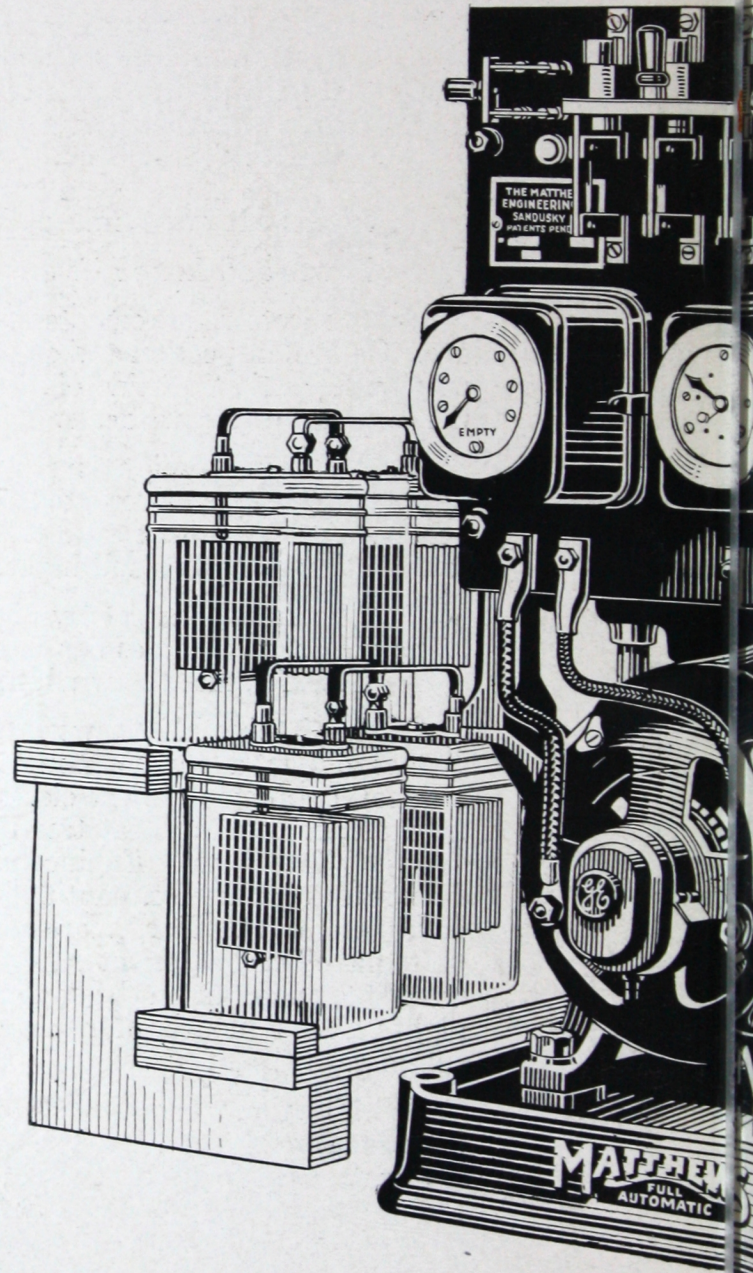
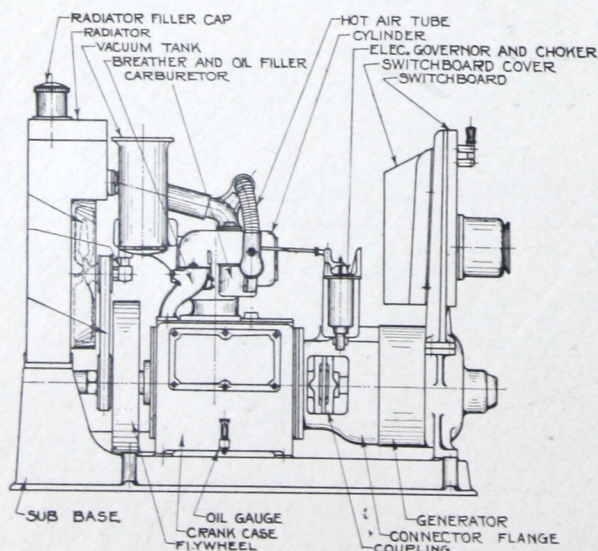
Model JR has all the Full-Automatic features described on page 12, Matthews Engine, General Electric Generator and glass jar Storage Battery.

Fuel Consumption

Model JR Plant will light fifty 20-watt lamps for three hours continuous running, using one gallon of fuel, and at the end of the run the batteries will be fully charged, no current being required from the battery to help out on the load of 50 lamps.

Average fuel consumption is 1 gallon per week for lights and ironing.

All Parts Named

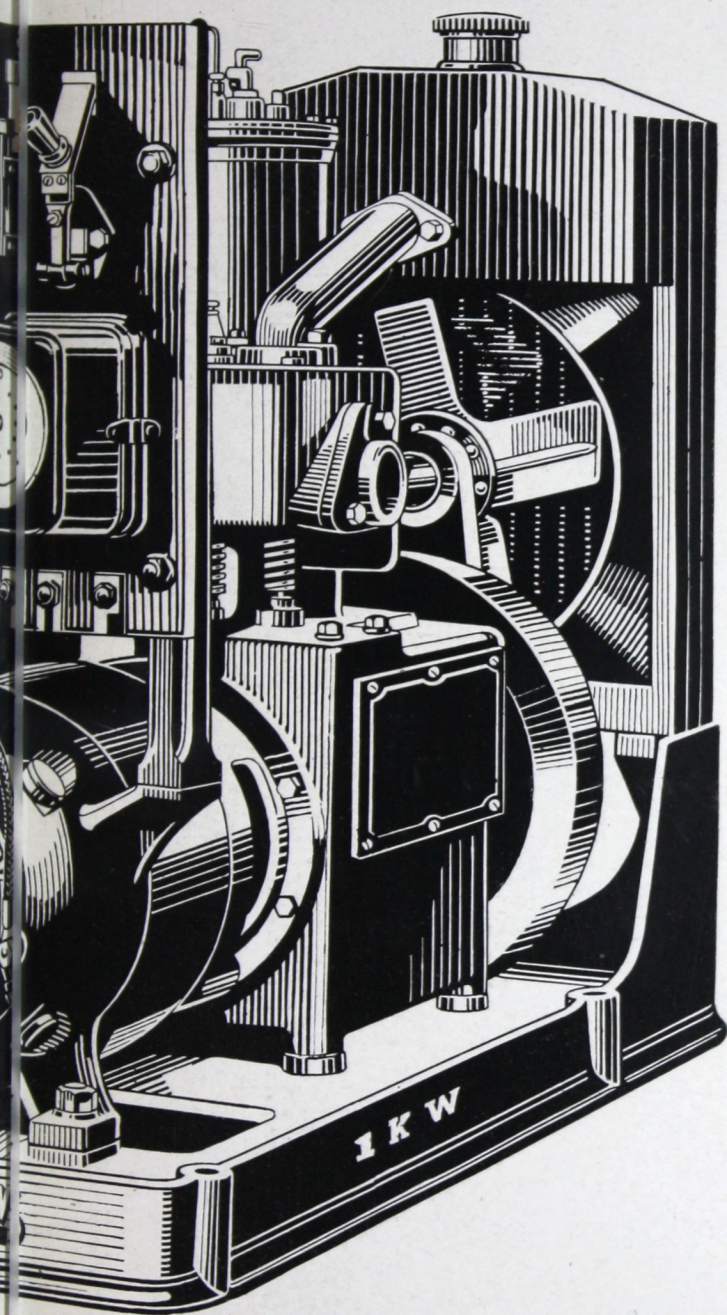


Complete Model JR

Matthews engine coupled to General Electric generator, magnetic governor, make and break timer and hydrometer; genuine carburetor; 80 ampere-hour battery; full-automatic switchboard; muffler; wrench; two extra fuses; five feet flexible copper wire with terminals attached. All complete ready to connect battery wires to the switchboard.

1000 Watt, Light and Power Plant Model JR

—Used By Leading Governments



JR—The Right Size

Fifty 20-watt lights from generator alone as long as engine is running.

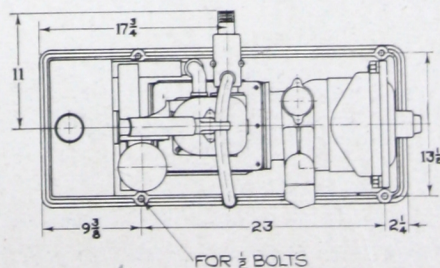
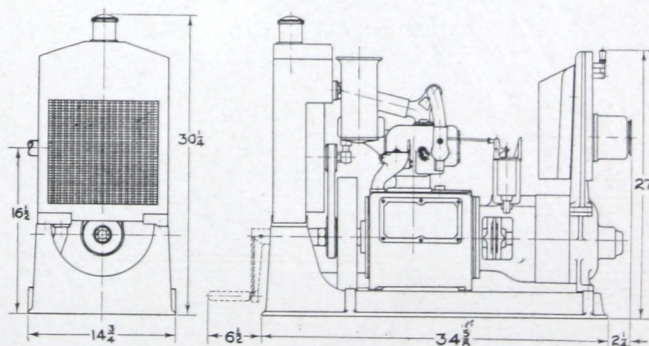
The combined generator and battery capacity exceeds normal rating.

Twelve or more lights for 10 hours from battery alone.

Switchboard

Switchboards are regularly mounted upon Model JR Plant as shown. If specified when ordering, we can furnish switchboard adapted for wall mounting instead. See Page 21.

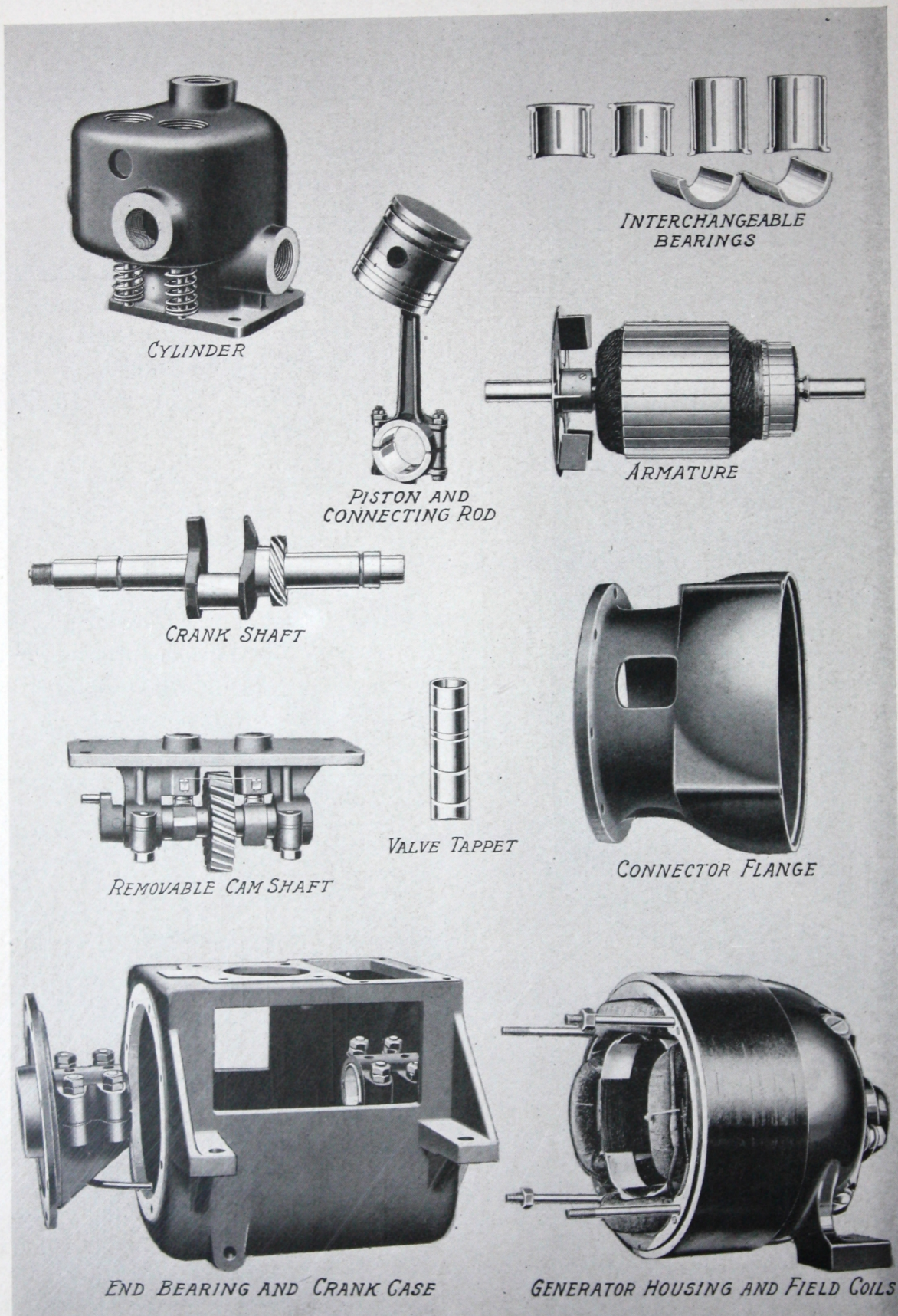
Dimensions



Equipment Consists of—

Electric generator, mounted on rigid base; electro-magnetic coil; radiator; Stewart Vacuum feed Storage Battery; 16 glass cells and counter cell; instruction books; extra spark plug and socket; gasoline line tubing; battery-to-switchboard cables, run and give light with the attaching of the

Model JR Engine Parts



Matthews design is simple and has been perfected through nine years of use and has back of it twenty years of engine manufacturing experience. Every part is quickly accessible. Every wearing part is oversize. Quality is a watchword

Engine Design Right—to the Minutest Detail

The first Matthews Engine was built in 1912 and ever since, it has been built and improved in strict adherence to the highest manufacturing ideals by men who “know their craft.”

All parts of the Model JR engine are easily accessible. It is possible to take engine apart in a very few minutes. All wearing parts are interchangeable.

Matthews Lighting Plants are equipped with the well known Stewart Vacuum tank to draw the fuel from tank placed in ground outside. This is the same fuel tank you will find under the hood of the best makes of automobiles. It is safe, convenient, economical and permits the use of one large tank for the storing of all fuel used about the place. Engines, tractors and automobiles all require fuel and everyone stores his supply for safety in a large tank beneath the ground. The vacuum system on the Matthews plants draws from distances 5 feet below the plant and 30 feet away.

The governor is the electro-magnetic type. It maintains constant voltage and also provides for the batteries receiving the proper charging current regardless of the number of lights being used and the length of time the plant is running.

Matthews plants automatically keep the batteries properly charged and protect them against excessive charge or discharge, thus insuring long life.

You can see when the engine needs oil by observing the gauge on the side of the crankcase. The crankcase holds 3 quarts, enough to run engine continuously for long periods.

The ignition is by a make and break timer, mounted on an extension of the cam shaft, and a non-vibrating ignition coil. Timer and coil are conveniently located. The 32-volt battery system is used.

The carburetor is a well-known standard make. It is a two-jet carburetor of the float-feed automobile type and costs many times as much as the cheap mixing valves so frequently used, but saves its cost in fuel.

The valves are of large diameter with a small lift which produces quiet operation and long life.

Adjustment for valve wear is easily and quickly made.

Complete water jacketing insures proper valve cooling.

The crank shaft is made of the highest grade steel, annealed, and accurately ground to size.

It is provided with integral counter balances to insure steady vibrationless operation.

By observing the size of the bearing you will realize what a large crank shaft we use. No Matthews crank shaft has ever been broken.

The connecting rods are drop forgings, combining strength with minimum weight.

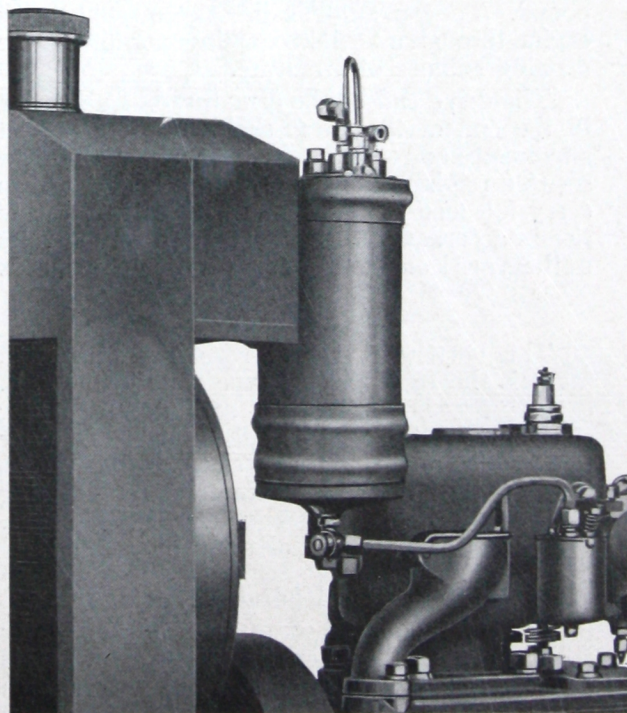
The cam shaft is made of carbon steel with integral cams. After being hardened, the cams are carefully and accurately ground.

The cam shaft is driven through helical gears insuring absolute quiet in operation.

The entire cam shaft mechanism, including bearings, gear and tappets, is mounted on a bearing plate and may be removed as a unit without disturbing the other parts of the engine.

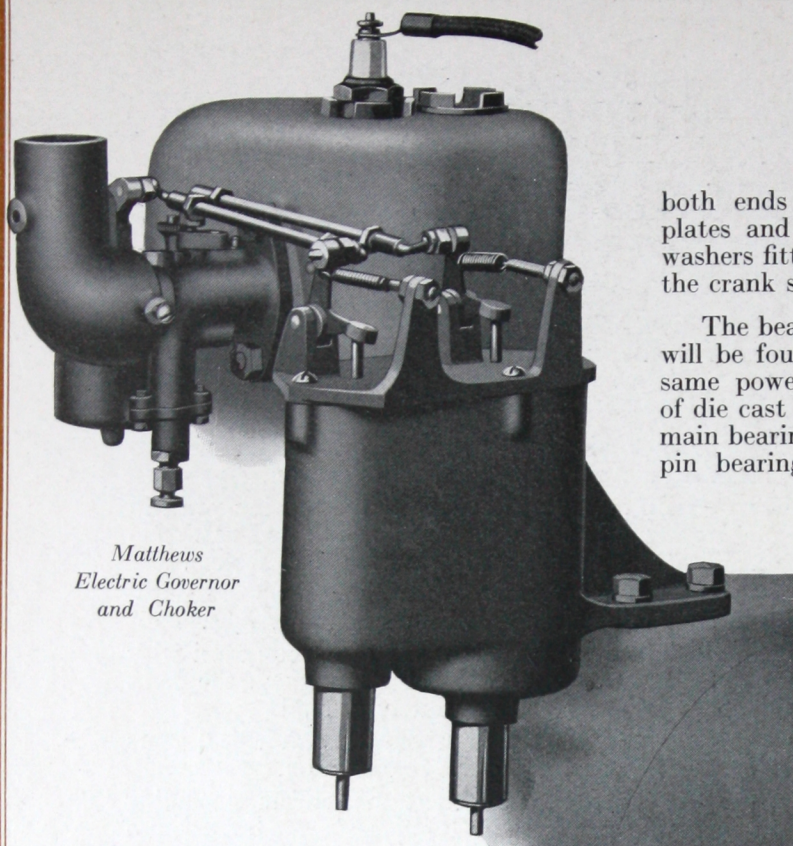
The Engine

The engine is a single cylinder, water-cooled, 4-cycle, 3" bore x 3" stroke. The cylinder is "L" head type. Crank case is the "barrel" type,



Model JR large capacity radiator with convenient filler cap; Stewart Vacuum fuel tank described above; Float-feed carburetor. Note ample filler for lubricating oil. Never more than one quart of fuel inside building

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE



*Matthews
Electric Governor
and Choker*

The Engine (Continued)

both ends being enclosed by interchangeable bearing plates and having hand-hole plates on either side. Felt washers fitted to bearing plates prevent oil leaks around the crank shaft.

The bearings of this engine are of exceptional size as will be found by comparison with other engines of the same power rating. Main and crank pin bearings are of die cast babbitt, interchangeable and adjustable. The main bearings are $1\frac{5}{8}$ " diameter x $2\frac{1}{2}$ " long. The crank-pin bearing is $1\frac{5}{8}$ " diameter x $1\frac{3}{4}$ " long. Cam shaft bearings, which are adjustable are $\frac{5}{8}$ " diameter x 1" long. Wrist pin bearings in the piston are $\frac{3}{4}$ " diameter x $\frac{3}{4}$ " long.

The engine is thermo-syphon cooled in conjunction with the large capacity radiator.

All internal parts of the engine are lubricated by splash from a dipper on the connecting rod. An oil gauge is provided to indicate the quantity of oil in the crank case.

The Generator

The General Electric generator is shunt wound, 4-pole construction. The field ring and the armature are of laminated construction instead of old style castings. All windings are treated with moisture- and corrosion-proof compound. The generator is direct connected to the engine through a flexible coupling, permitting the running balance of armature.

The drive end of the armature has a bearing in the end of the crank shaft, insuring perfect alignment and reducing the over-all length of the set to a minimum. The generator is designed to carry full load for ten hours with a temperature rise in accordance with the standardization rules of the American Institute of Electrical Engineers.

The Battery

The battery furnished regularly with each plant is the 16-cell sealed type glass jar 80 a. h. capacity, (8 hour discharge rating). A counter electromotive force cell is also furnished in order to regulate voltage on the service line and prevent injury to the lamps. Hydrometer and connecting cables to switchboard are standard equipment. See Glass Jar Battery illustrated on page 31.

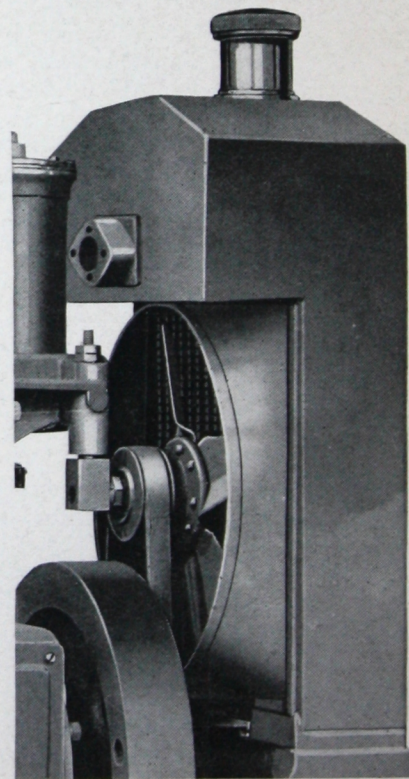
The Radiator

For continuous heavy duty operation, water cooling always has been the most used. It is practical, clean and trouble proof. Only with water cooling can correct running temperatures be maintained. The same anti-freezing solution you use in your car will serve in your Matthews plant.

The Governor

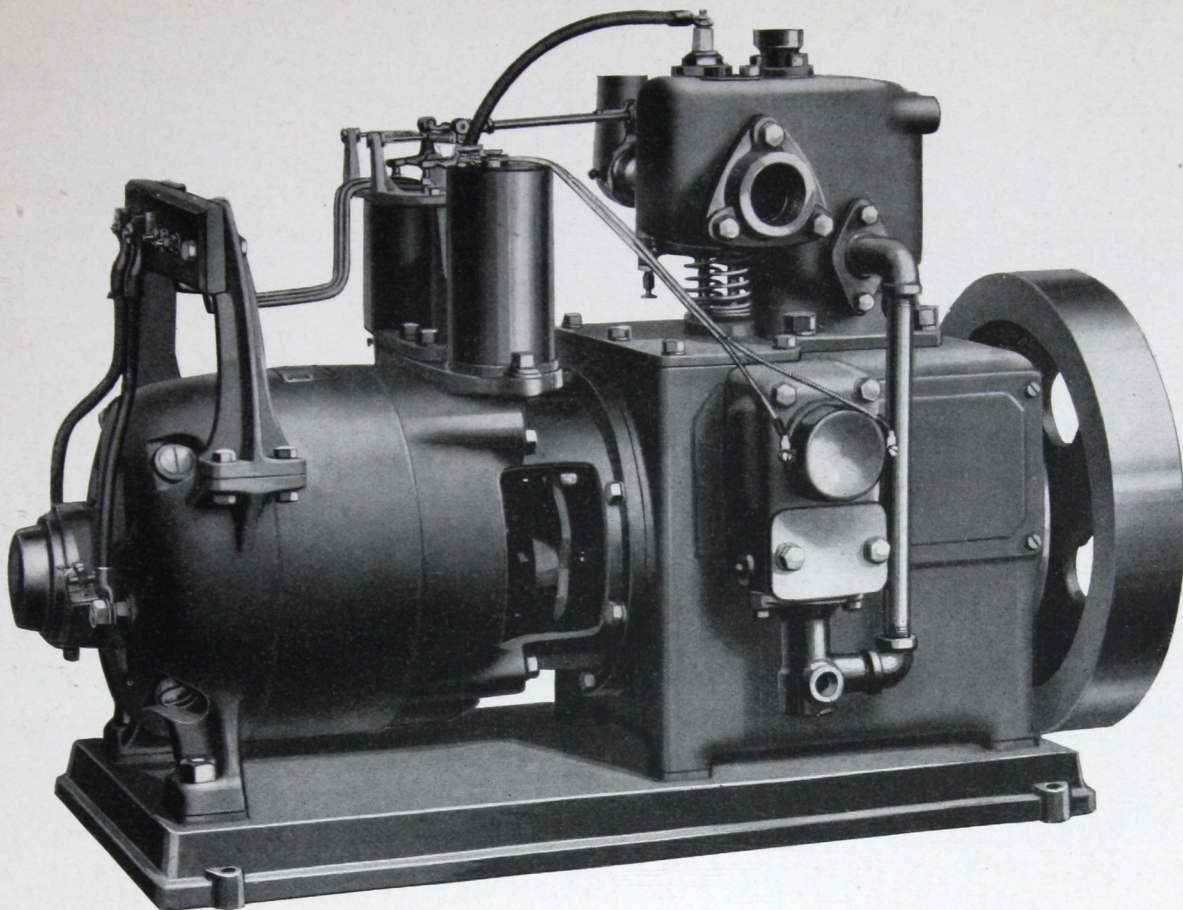
Positive Electric Governor control is a feature of Matthews plants. Matthews engine speed is controlled without any attention from the operator and adjusts itself to the load and the condition of the battery. Once the governor is set it seldom needs adjustment.

The position of the longer plunger is controlled electrically and this plunger regulates the throttle. A second plunger restricts or chokes the air opening for cold weather starting. It opens as the engine gains speed. No adjustments are necessary on these parts.



Four-blade ball-bearing fan is used; belt tightener adjustable; both pulleys grooved; large water inlet into radiator tank facilitates circulation. Fan housing increases quantity of air handled by fan

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE



Matthews *Full-Automatic* Model JRM Marine Plant, 32 Volt, 50 Light

Model JRM Marine Lighting Plant is the Model JR standard plant *without radiator*, but with *water circulating pump* and water pipe connections.

Pump

Pump is plunger type—operates at half engine speed and is lubricated from engine base. Pump cover carries timer. Slow speed of pump eliminates pounding and appreciable wear. All working parts of pump quickly accessible. Observe the construction is such that water cannot leak from pump into boat.

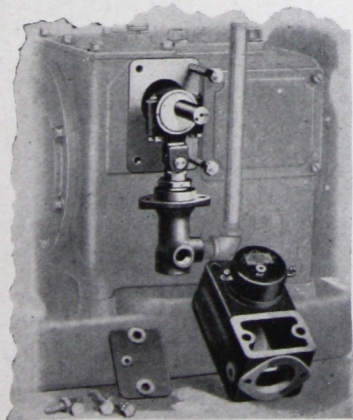
Switchboard

Switchboard may be mounted on plant or separately as most convenient. Removing it permits plant to be installed in limited space.

Switchboard adapted for wall mounting is always shipped with Marine plants unless ordered mounted on plant.

Fuel Supply

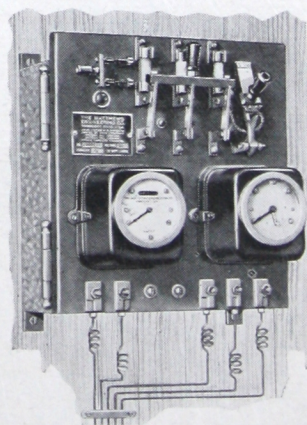
Stewart vacuum fuel lift system is furnished as standard equipment. It is mounted on cylinder.



*Water circulating pump,
cover removed for inspection.*

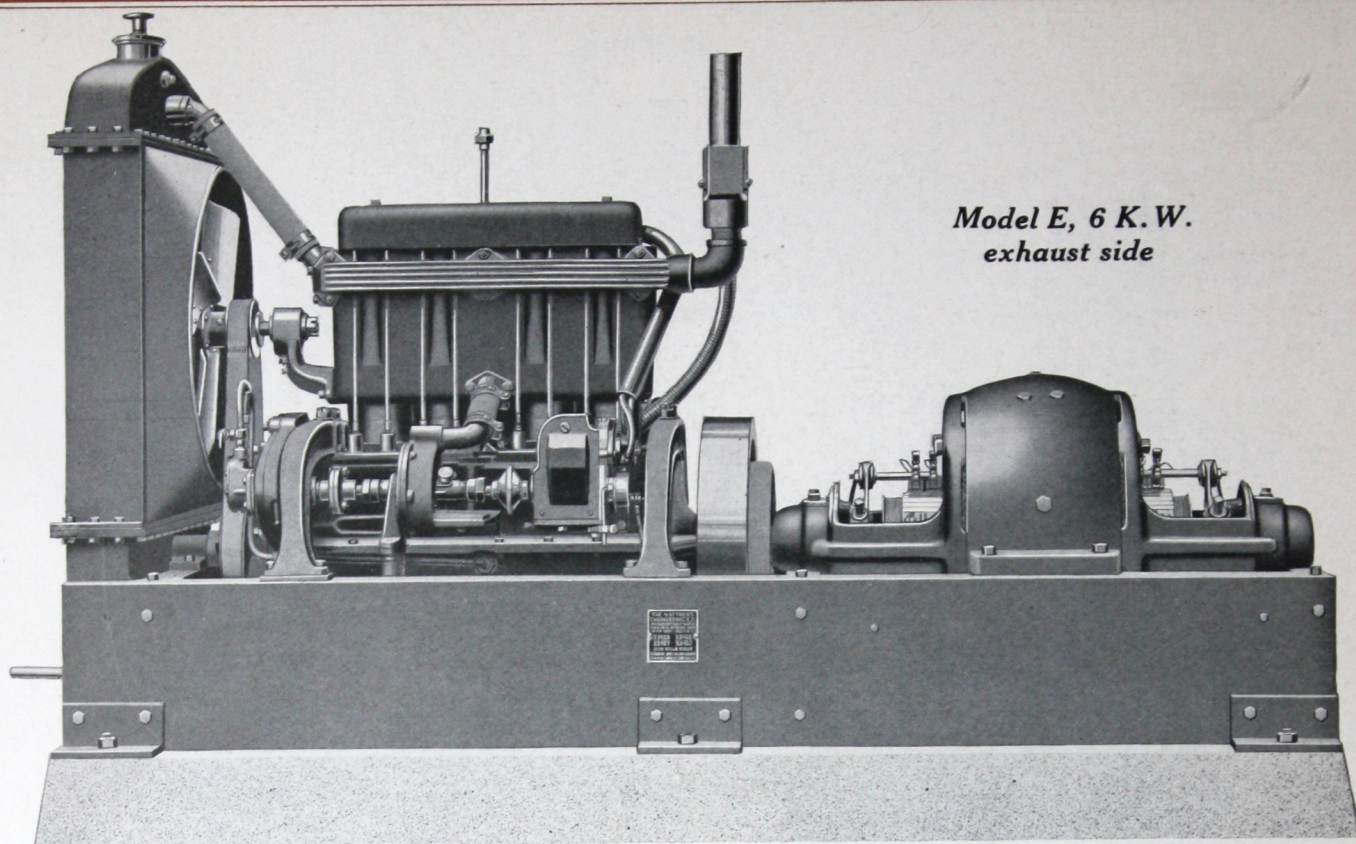
JRM Weights and Dimensions

Exact weight of plant as shown above.....	262 pounds
Weight of switchboard as shown here.....	41 pounds
Length over all.....	32 inches
Height over all without vacuum tank.....	23 inches
Height over all with vacuum tank.....	29 inches
Width over all.....	16½ inches
Switchboard—Height 14"; depth 9½"; width 12".	
Distance between centers of lag-screw holes of	
cast iron base.....	20½" x 11"
Pipe Sizes—exhaust 1¼"; water inlet ¼"; water outlet	
½"—all standard pipe threads. Gasoline connection	
to carburetor, ¼".	



*JRM switchboard adapt-
ed to wall mounting.*

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE

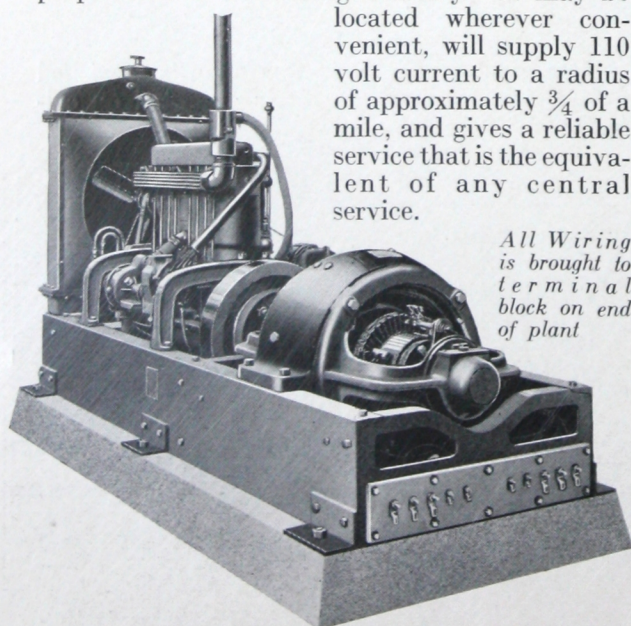


*Model E, 6 K. W.
exhaust side*

Matthews 110 Volt, 300 Light, 6 K. W., *Full-Automatic* Light and Power Plant—Model E

The Matthews *Full-Automatic* Model E, 6 K. W. Electric Plant with its battery equipment of 56 cells, 120 ampere-hour glass jar batteries and its *full-automatic* switchboard is a most highly desirable plant for lighting large suburban residences and estates, for community lighting, for villages, and for factories or groups of homes. Its *full-automatic* features eliminate the constant attendance of an engineer, and take proper care of the storage battery. It may be

located wherever convenient, will supply 110 volt current to a radius of approximately $\frac{3}{4}$ of a mile, and gives a reliable service that is the equivalent of any central service.



*All Wiring
is brought to
terminal
block on end
of plant*

This is identically the same plant as the United States Government used on all the new transports ordered by the Shipping Board and for various uses, described on pages 6-9. There is absolutely no difference between the domestic generating plant and the plant which the Government selected and used.

The 6 K. W. plant is neatly aligned and securely and solidly mounted on 10" steel channels weighing 15 pounds to the foot. This structural steel base is rigid, comparatively light and attractive looking, and practical for all kinds of installations.

The output of the set is controlled by an ingenious electro magnetic governor. It holds the voltage on the line constant and insures that the batteries receive the proper charging current at all times regardless of the load on the line and of the length of time the plant has been running.

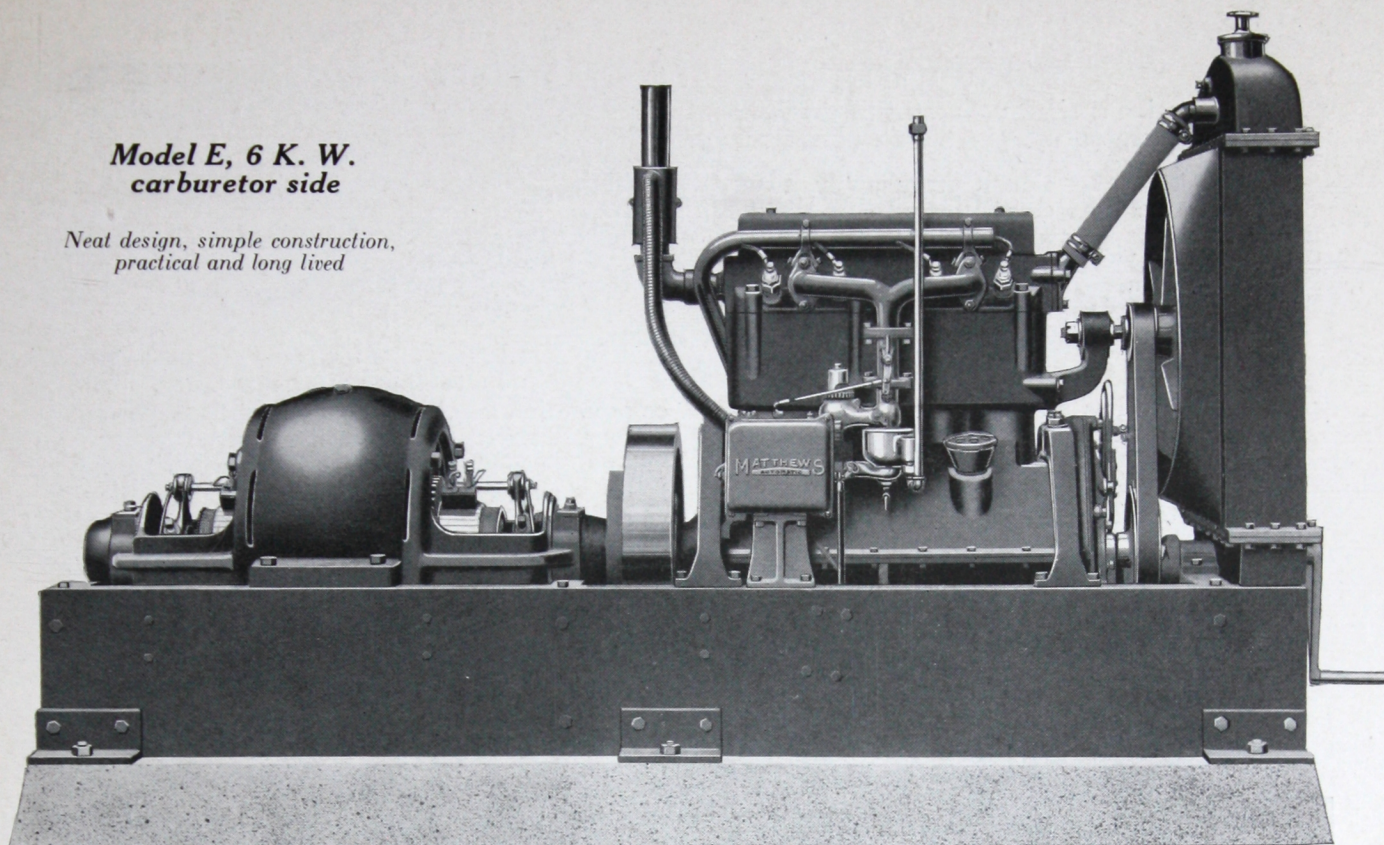
Dimensions and Weights

Height over-all.....	42"
Length over-all.....	80"
Width over-all.....	32"
Weight without batteries.....	1700 lbs.
Weight of batteries.....	2400 lbs.
Weight of switchboard.....	260 lbs.
Size of switchboard.....	30 x 44"
For battery data see page 31.	

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE

**Model E, 6 K. W.
carburetor side**

*Neat design, simple construction,
practical and long lived*



A Standardized Unit—Matthews Engines—General Electric Generator—and Large Storage Battery

General Electric Generator

Generator specifications are identical with the 1 K. W. generator type. However, generators of 6 K. W. sizes are built with double commutators; one commutator furnishes 120 volt current for the line and the other commutator furnishes a booster current of 20 volts for charging the storage batteries. The wiring to these two commutators is taken care of in the switchboard and the owner gives the matter no further thought. This does away with counter-cells, and is more economical of power and fuel in a large sized plant.

The Battery

The battery consists of 56 cells, enclosed type. The capacity is 120 ampere-hours, based on an eight-hour discharge rate.

The Engine

The engine is 4 cylinder, 4 cycle standard Matthews engine, $3\frac{1}{2}$ " bore x 5" stroke; is of the overhead valve type with cylinder block cast integral with upper half of crank case; lower half of crank case is a steel stamping; valves and rocker arms are enclosed.

The main bearings are 2" diameter throughout and of the following lengths:

Front, $2\frac{3}{4}$ "; center, 2"; rear, $3\frac{1}{4}$ ".

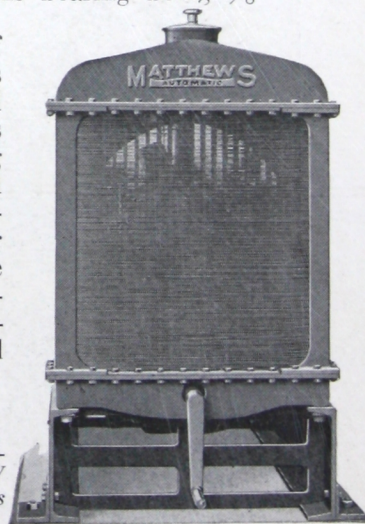
Crank pin bearings are $1\frac{3}{4}$ " diameter x 2" long. These bearings are all adjustable and interchangeable and are secured by brass retainer screws. Cam shaft bearings are of bronze of the following dimensions:

Front, $1\frac{13}{16}$ " diameter x $2\frac{1}{2}$ " long; center, $1\frac{3}{4}$ " diameter x $2\frac{1}{4}$ " long; rear, $1\frac{11}{16}$ " diameter x $2\frac{1}{4}$ " long.

The piston pin has a bronze bearing in the connecting rod, size of this bearing being $\frac{7}{8}$ " diameter x $1\frac{3}{4}$ " long.

A gear pump driven off the accessory shaft pumps oil from the sump and delivers it into four troughs into which the connecting rods dip; a branch feed tube delivers oil to the timing gears. An oil strainer is provided and also a gauge to indicate oil level. Cylinders and bearings are lubricated by the constant level splash system.

Tractor type Radiator used on 6 K. W. and larger sized plants



THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE

6 K. W. Specifications—continued

The engine is direct connected to the General Electric generator through a flexible disc coupling.

The Stewart Vacuum fuel supply tank is regularly mounted on the cylinder and will lift fuel from outside tank. The plant can also be operated without this fuel lifting device, using gravity supply system if desired.

High grade carburetor is used, with automatic electric solenoid choker for starting.

Ignition wires are neatly enclosed in tubing.

Hot air is taken to the carburetor from a heater attached to the exhaust.

High tension magneto is standard with all 6 K. W. and larger plants.

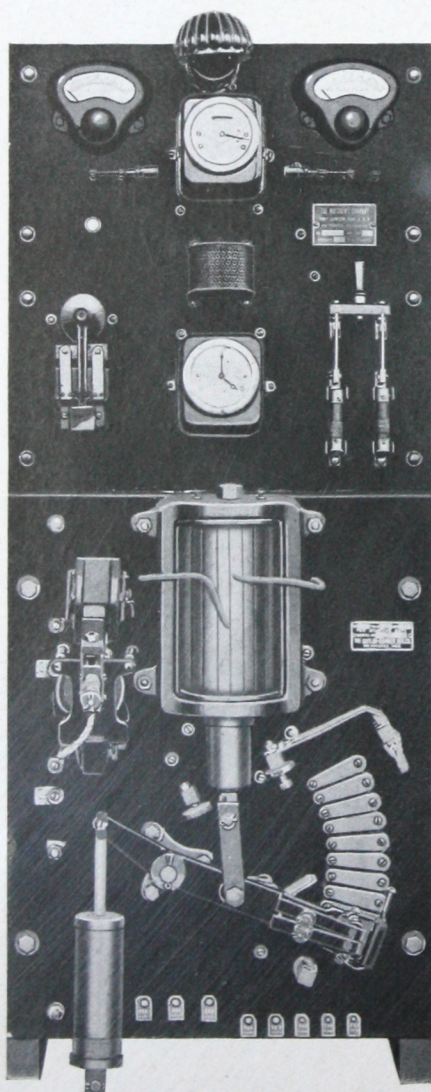
A good high grade tractor type radiator is mounted on the steel base. The capacity of this radiator was guaranteed to the Government to cool the lighting plant operating under 50% over-

load in equatorial climates. The radiator has cast iron water tanks above and below and cast iron side members, these being standard Government specifications. No ordinary conditions of operation or use can possibly injure this radiator.

The fan, mounted on a heavy bracket and ball bearing is a good four-blade, heavy duty, tractor type. It circulates the air at 20 feet per second.

The circulating pump handles 90 pounds of water per minute through the radiator. The co-ordination of the factors of efficient cooling surface, efficient pump action and extra large volume of cooling air absolutely eliminates heating troubles under severest overloads. The plant will run with equal efficiency in an unheated basement or a hot boiler room or factory corner.

We guarantee the Matthews cooling system of this plant to keep the temperature of the water from becoming over 85 degrees warmer than the atmosphere.



6 K. W. Full Automatic Switchboard

6 K. W. Full Automatic 110 Volt Switchboard

The switchboard used with Matthews 6 K. W. electric units is the standard Matthews *Full-Automatic* Switchboard, possessing all *full-automatic* functions described and illustrated on pages 10-11.

Owing to the switchboard being larger, however, the instruments are arranged differently from those on the JR Board. Voltmeter and ammeter are placed across the top of the board and an automatic starting rheostat is introduced at the bottom of the board. This is a device which introduces sufficient resistance into the battery line for starting to prevent injury to the generator and too rapid discharge of the battery. As the generator acting as a motor begins to spin the engine, the plunger lifts the starting lever gradually and cuts out the resistance as the starting lever passes from one contact point to the other. The dash pot attached to the starting lever regulates the changing resistance.

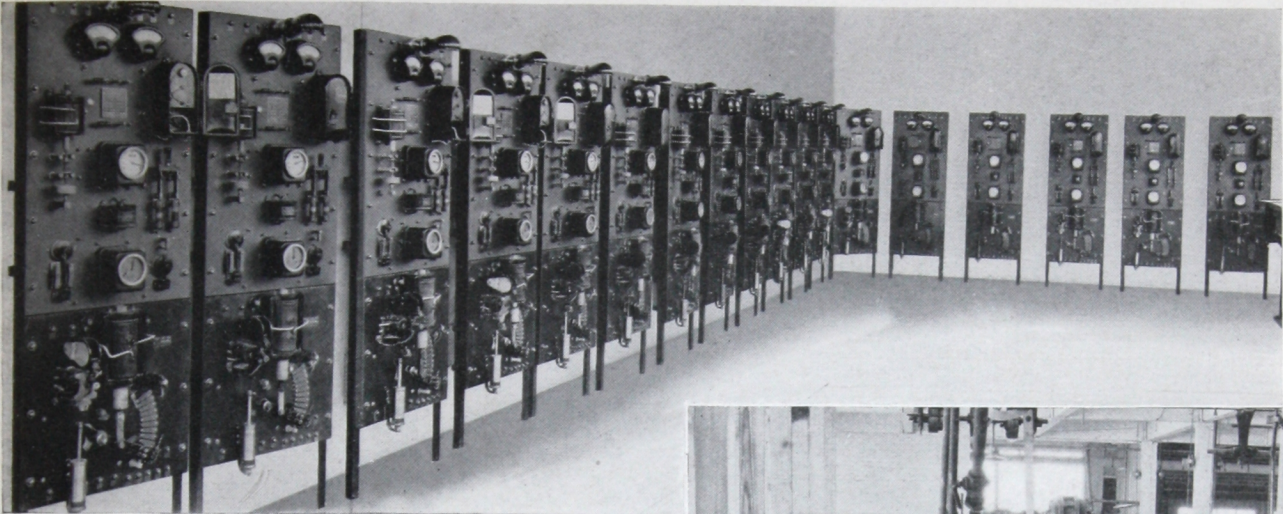
All Matthews switchboards have the terminals at the bottom properly marked for wiring to the generating unit, and at the top, the terminals are properly marked with the prominent brass markers to show where to attach the light and power lines.

The wiring of the plants requires no expert help; merely attach wires to points tagged. On the end of the generating unit is a terminal block which has brass tags, similar to those at the bottom of switchboard panel. It does not require an electrician to install a Matthews large sized *Full-Automatic* Light and Power Unit nor does it require an engineer to operate one.

All plants are shipped complete ready to set up and run.

The Overload Relay on the 6 K. W. board is adjusted to start the plant when any load amounting to 25 amperes is used and automatically stops the plant when the load falls to 17 amperes, although if the batteries are not fully charged when the load falls to 17 amperes the plant continues to run until the batteries are charged.

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE



Matthews Full-Automatic 6 K. W. switchboards used by the Government on new transports. Uncle Sam selected Matthews Full-Automatic boards after three months of continuous test at the hands of his engineers and used same standard design furnished to our private users

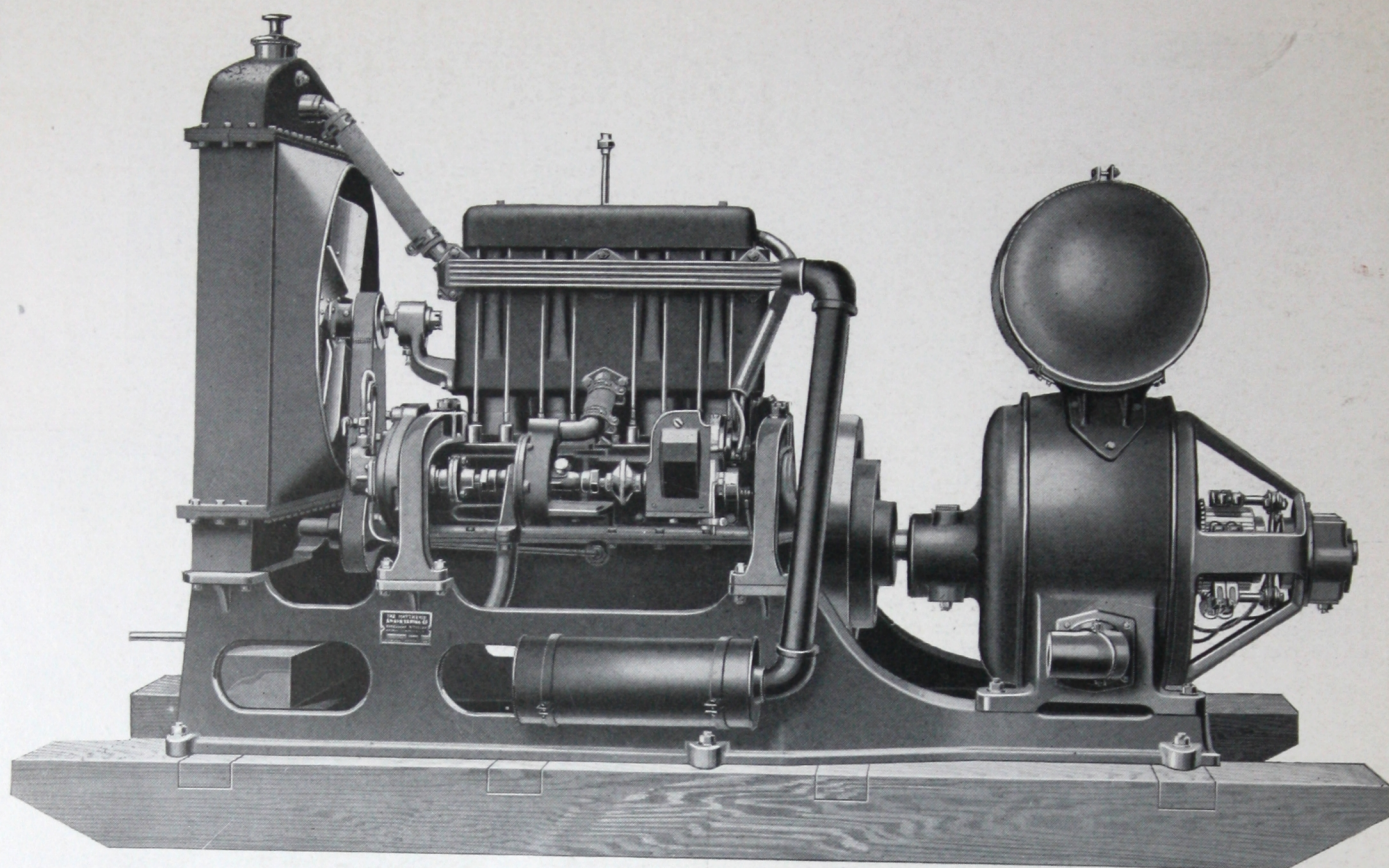
The 6 K. W. Full-Automatic Plant size has been a standard with the Matthews Engineering Company for over four years. These plants were originally sold for installing in large boats as auxiliaries and in residences and estates where the owner wanted city lighting brought to his country home. However, the reliability shown by these lighting plants introduced them into the Government service on the new transports built by the Shipping Board, and the impetus given to manufacture during the emergency period has enabled us to build these plants in larger quantities and at a much lower price than formerly. So a large number of them are being installed for large residence use, for lighting villages, communities, groups of stores, as well as for the finest country homes and estates. In Cuba and South America they are lighting plantation homes, sugar factories, road building and construction operations. Their reliability is unquestioned. We build these plants on a production basis and carry them in stock at all times.

We frequently install "Twin" installations, consisting of two 6 K. W. plants, where the use of the current is such that it would not be economical to run a 12 K. W. plant all the time, but where a 12 kilowatt capacity is at times required. We furnish a duplex switchboard and in a case of this kind parallel the two 6 K. W. plants in such a way that the most economical and practical electrical service possible is secured. See page 30.



These are the 6 K. W. generating units in final test and inspection by Government experts in our plant. These are the plants which were shipped to the sea-coast and mounted on the upper deck of all the Shipping Board's new transports. They were "On Guard" and did their bit during the great emergency

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE



Matthews 110 Volt, 500 Light, 10 K. W. Plant—Model G

Unit is self-contained, consisting of gasoline engine direct connected to a generator, being complete with cooling system, gasoline supply feed, muffler, switchboard and all necessary equipment, mounted on 6" x 6" skids.

Engine— $3\frac{3}{4}$ " bore x 5" stroke. Ignition system, fan, radiator and coupling are identical in design and specifications with the engine used on 6 K. W.

Generator is compound wound, 4 pole with commutating poles; it is designed for 110 volts at no load and 110 volts at full load, allowing for the accompanying drop

in engine speed. All windings are treated with moisture- and corrosion-proof compound; armature is driven by flexible disc coupling, permitting the armature to "float." The generator is designed to carry full load for ten hours with a temperature rise in accordance with the standardization rules of the American Institute of Electrical Engineers. General Electric Co. generator is used.

Switchboard is supported by brackets; on it are mounted a volt meter and ammeter, fuses and line switch, magneto switch and a field rheostat. All terminals are on back of board.

Sub-Base—Is ribbed and cored to give maximum of strength with light weight.

Governor—Maintains the speed constant within very close limits; it is driven by chain and sprockets from the crankshaft and is equipped with a flexible drive shaft to allow for misalignment. See governor cut opposite.

Muffler may be mounted securely to the sub-base. Furnished with piping shown.

Magneto Ignition is standard. All ignition wiring is complete, ready for running.

Cooling—Guaranteed to cool in temperature up to 120°F. The radiator, fan and water pump are as specified for cooling these plants in tropical zones and we have continued the same specifications without change. These sets are in daily use with traveling circuses, in Cuba and Java for searchlight service, in the Suez Canal and Palestine, in Siam and on shipboard in every climate.

Equipment—A tool box is furnished with tools necessary for maintenance and adjustment of the outfit.

Length including skids, 86"; plant only 73".

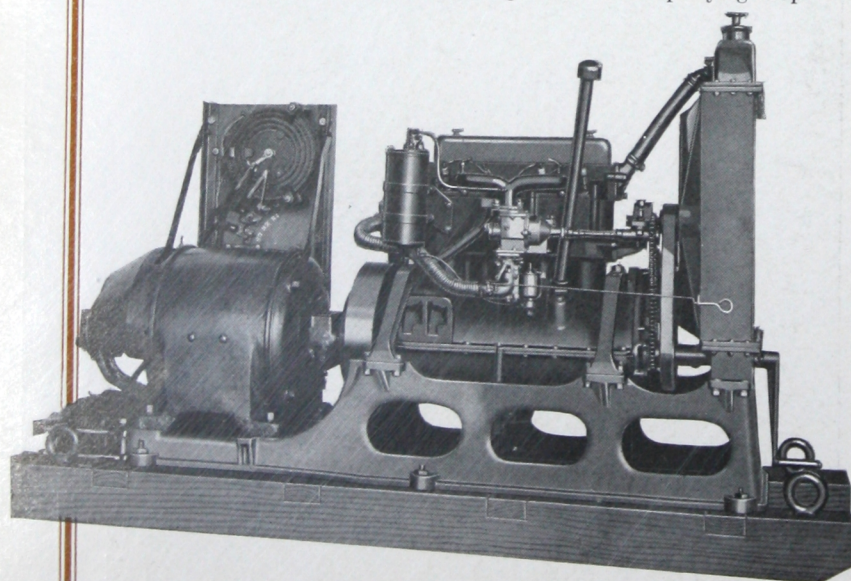
Height over all.....46"

Width over all.....30"

Weight.....1800 lbs.

Packed for export.....3000 lbs.

Cubic contents export box.....77.4 cu. ft.



Electric welding set; composed of special low voltage welder driven by standard 10 K. W. engine unit. Governor shown is same as used on 10 K. W. Stewart vacuum fuel supply tank is furnished instead of gravity fuel tank if specified on 10 K. W. also

15 K. W., 750 Light Plant

15 Kilowatt Sets

Engine—The engine is 4 cylinder, 4 cycle, $4\frac{1}{2}$ " bore x $5\frac{1}{4}$ " stroke. It is of the T-head type with cylinders en bloc. Crankcase is in two pieces, split at the centerline of crankshaft. Valve mechanism is enclosed, yet readily accessible by removing cover plates.

Bearings—Main bearings 2" diameter and average $2\frac{3}{8}$ " long. Connecting rod bearings $1\frac{7}{8}$ " diameter x $2\frac{3}{8}$ " long. All bearings die-cast, adjustable and interchangeable. Die castings made of babbitt having a composition of 93% tin.

Camshaft Bushings are bronze of the following sizes: Front, $2\frac{1}{16}$ " diameter x $2\frac{1}{4}$ " long; center $2\frac{1}{32}$ " diameter x $1\frac{1}{2}$ " long and rear $\frac{7}{8}$ " diameter x $1\frac{7}{8}$ " long.

Piston Pin is clamped to the rod and has two bearings in the piston, $1\frac{3}{16}$ " diameter and $1\frac{1}{4}$ " long.

Crankshaft—Crankshaft drop forged, high carbon, open hearth steel, heat treated, ground and accurately balanced.

Connecting Rods—Drop forgings, heat treated; the caps are secured by four alloy steel bolts.

Lubrication—A plunger pump, operated off the camshaft, draws oil from the lower crankcase, after being double screened, and delivers it under pressure to the main bearings. The overflow drains into trough under each connecting rod and is splashed to all moving parts.

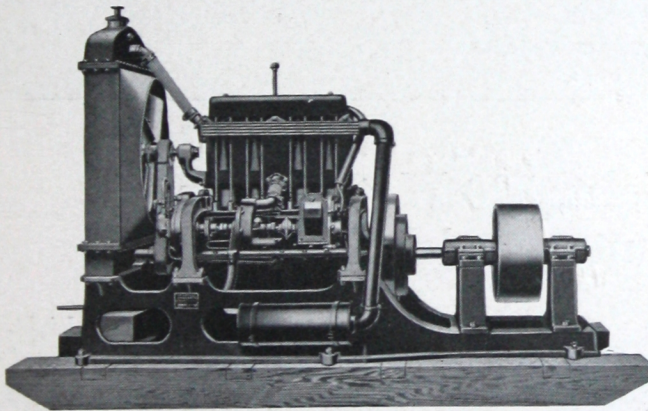
Ignition—Magneto.

Generator—125 volts, 15 K. W.—with overload capacity. Same specifications as 10 K. W. generator. Switchboard same as 10 K. W.

15 K. W.—Dimensions and Weights.

Length over all—106"	Weight—3600 lbs.
Height over all—56"	Export packed—4500 lbs.
Width over all—38"	Export cubage—120 cu. ft.

20 H. P. Model MF Power Unit. Weight 1200 Lbs.



Speed—600-1200 R. P. M. adjustable while running.
 Rating—20 H. P. Length—72"
 Height—42" Width—30"
 Weight—1250 lbs.

Guaranteed to cool properly pulling 20 H. P. in temperatures up to 120°F. Equipped with Magneto, water pump, 16" x 8" pulley furnished standard and any diameter up to 12" can be used. Friction clutch can be furnished. Governor shown on opposite page. We also furnish this power unit without pulley for attaching to special machines, compressors, pumps, etc. Blue prints of base showing all dimensions for lining up to engine furnished.

Endurance of Matthews Large Units

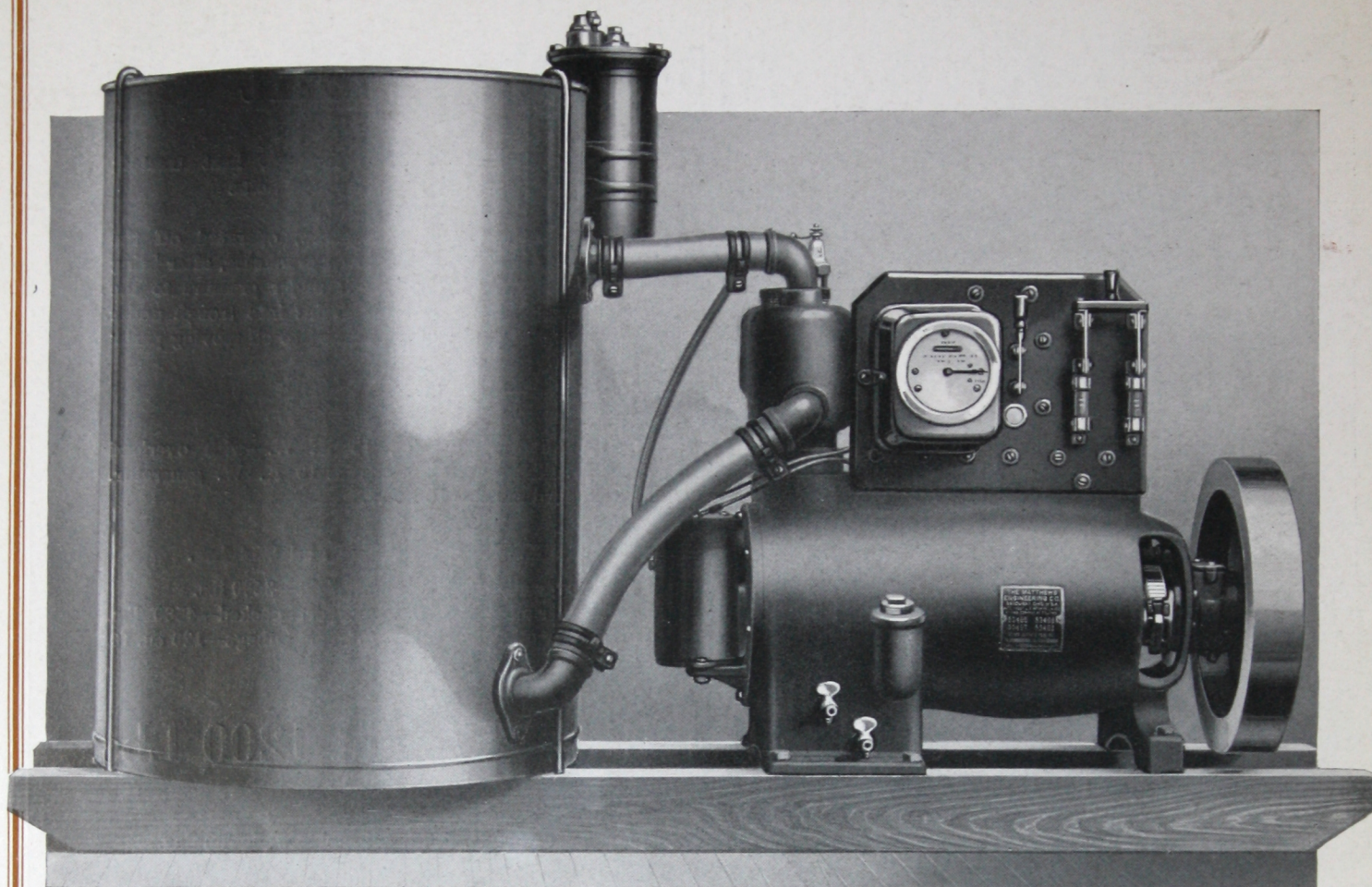
The remarkable endurance of these 10 K. W. and 15 K. W. units is attested by the experience of hundreds of owners. One user of the welding set operated for 22 days and nights at Erie, Pa., where three shifts of workmen were employed, cutting a ship apart, preparatory to going through the Welland Canal in sections. The set paid for itself several times over in this period of continuous operating and proved itself capable of endurance beyond any expectations.

After this demonstration had been made of the efficiency and endurance of the sets, an Engineer of the General Electric Company at Erie recommended the sets so highly that four complete units were sold to the Roumanian Government for use in railroad repair shops.



Matthews 10 K. W. generating set for operating searchlight in the royal army of Siam. This was ordered by an English Army officer who operated a similar set in France and recommended Matthews set as the best

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE



Matthews 32 Volt, 15 Light, 300 Watt, Automatic Lighting Plant—Model H

Model H was designed and built by us at the urgent request of a large number of our customers and representatives who hardly required a 1 K. W. plant with its capacity for *Power* as well as light, but recognized the need for a compact practical unit for lighting where not to exceed 15 lights would be required continuously.

The rating of this set is 300 watts—15 lamp capacity. This is the output of the generator without using any of the reserve in the battery.

This is another Matthews Automatic *Lighting* Plant, but is not supposed to be, nor recommended as, a *power* plant except under special conditions. A sewing machine, vacuum cleaner, fan, and various accessories, can be used with this lighting plant. The Model H is designed expressly for lighting yachts, boat houses, small residences, farms, and country homes where a 15 lamp lighting plant is large enough and where the requirement is *lighting* rather than power.

Specifications

Ratings are given in 20 watt lamps.

Rating continuous capacity..... 300 Watts, 15 lights

Speed..... 1200 R. P. M.

Gasoline consumption less than 1 pint per hour at full load.

Cost of operation: 1/5 cent per hour for each 16 candle power lamp, at 25c a gallon for gasoline.

Plant and tank on skids..... 160 lbs.

Plant and tank on skids (crated)..... 340 lbs.

Marine type plant without tank and skids..... 140 lbs.

Weight of battery crated..... 600 lbs.

Mounted on skids with tank:

Length of skids..... 44 3/4"

Height, base of skid to top of vacuum feed..... 29"

Width (diam. of tank)..... 16"

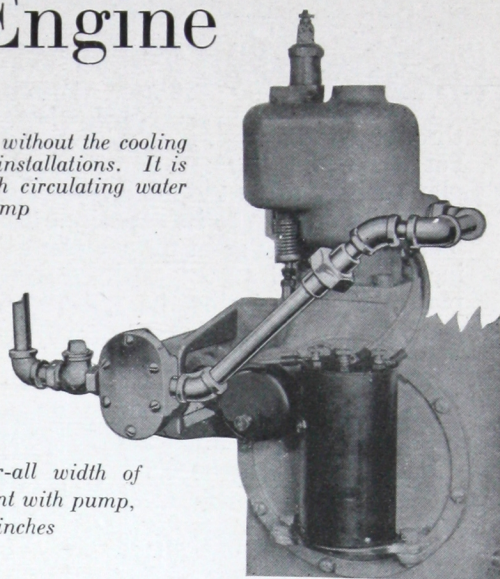
THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE

The Simplest Possible Combination of a Generator and Gasoline Engine

The generator frame and engine crankcase are one casting. This is rigid construction, assures alignment of bearings, reduces weight, number of parts and cost, and makes a very neat, compact unit.

The engine is the L head type, single cylinder, water cooled, with head and water jacket cast integral, and bolted to top of crank case. Engine is 2" bore and 3" stroke, $\frac{5}{8}$ " offset with crank. Main bearing $1\frac{3}{16}$ " diameter, 2" long, bronze. Connecting rod bearing 1" diameter x $1\frac{5}{8}$ " long, bronze. Ignition same as Model JR.

Model H is used without the cooling tank for Marine installations. It is then supplied with circulating water pump

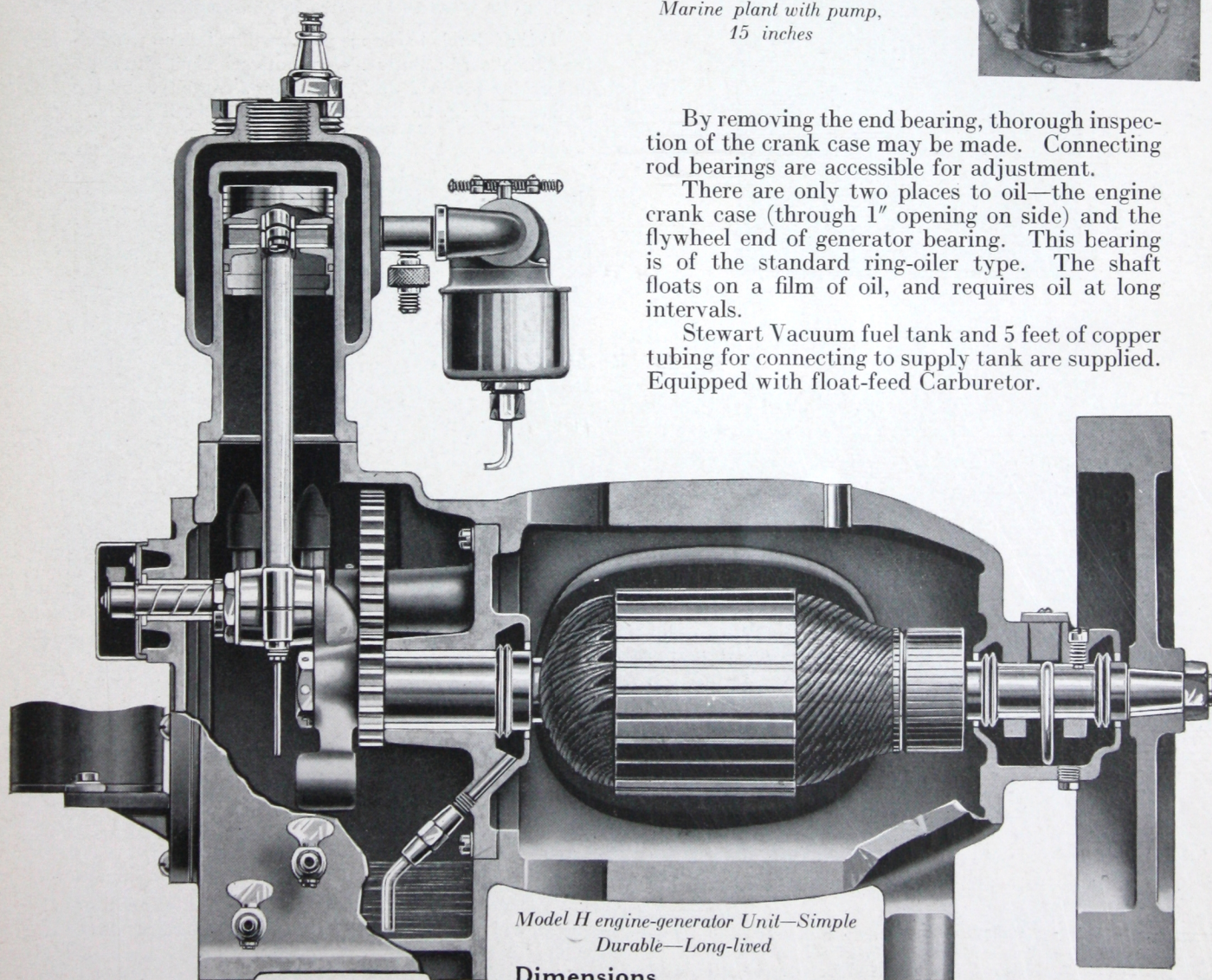


Extreme over-all width of Marine plant with pump, 15 inches

By removing the end bearing, thorough inspection of the crank case may be made. Connecting rod bearings are accessible for adjustment.

There are only two places to oil—the engine crank case (through 1" opening on side) and the flywheel end of generator bearing. This bearing is of the standard ring-oiler type. The shaft floats on a film of oil, and requires oil at long intervals.

Stewart Vacuum fuel tank and 5 feet of copper tubing for connecting to supply tank are supplied. Equipped with float-feed Carburetor.



*Model H engine-generator Unit—Simple
Durable—Long-lived*

Dimensions

From end of shaft at flywheel to edge of coil..... $22\frac{1}{2}$ " Width of plant without pump, 12"; with pump, 15".
From base of plant to top of spark plug..... $18\frac{1}{8}$ " From base of plant to top of switchboard $16\frac{9}{16}$ "

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE

Operations of Two Unit Plants

Matthews Full-Automatic Plants 32 volt, 1 K. W. and 110 volt, 6 K. W. are being operated as Twin Units on 2 K. W. and 12 K. W. installations respectively.

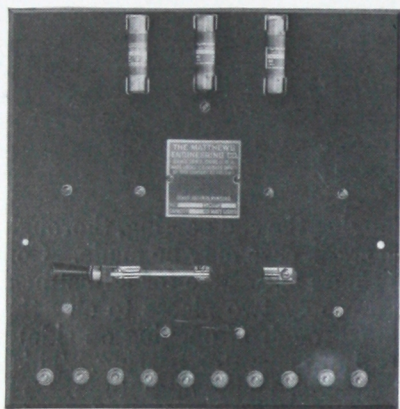
Two independent plants can be interconnected through what is known as a "Paralleling Switchboard Panel." By means of this panel, either plant can be made the main plant and will carry the main load, up to its capacity. But when the load becomes too great for one plant the paralleling switchboard automatically starts the second plant, to assist during the "peak" load.

When both plants are running, they are said

to be paralleled; that is, each plant carries half of the total load.

As soon as the load drops to the normal capacity of a single plant, the second or auxiliary plant stops (unless its battery requires charging, in which case it will continue to run until its battery is fully charged).

Each plant, of course, retains all its full-automatic functions.



Paralleling Switchboard Panel furnished with two model JR Plants when it is desired to operate them as a two unit plant up to 2 K. W. loads.

Detailed operation of 2 Model JR plants operating as a Twin Unit when connected through Paralleling Switchboard Panel.

Call plants A and B.

Case 1, where load is 1 K. W. or under.

Paralleling Switch at left side position as shown above determines that plant A only shall function as a single full-automatic unit until load exceeds 1 Kilowatt. If this switch be placed in right-hand position, only the B plant functions as a full-automatic 1 Kilowatt plant and plant A is inactive and is not called upon by the automatic functions until load is more than 1 Kilowatt.

It is advisable to change position of switch on paralleling panel at intervals, so that each plant carries alternately the main and auxiliary loads.

Case 2, when load is over 1 Kilowatt.

On the paralleling panel is an Overload Relay calibrated to start the second plant when load exceeds 30 amperes. When second plant starts the load is evenly divided between both generators.

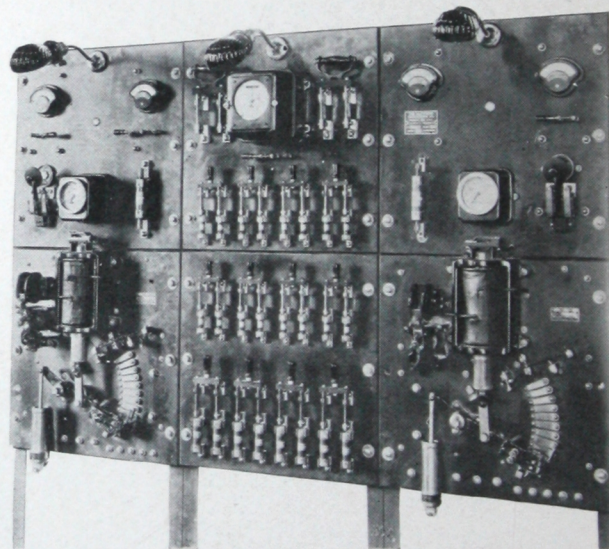
Both plants continue running until load drops below 1 Kilowatt.

If either battery is partially discharged the plant continues running until its battery is fully charged. If excess of 2 Kilowatt load is used both generators and batteries divide the load evenly.

Two 6 K. W. Twin Units—12 Kilowatt capacity.

When two 6 Kilowatt, 110 volt units are paralleled through the Paralleling Switchboard Panel the second plant starts when the load reaches 56 amperes.

It is advisable to change position of switch on paralleling switchboard at intervals, so that each plant alternates in carrying the load up to one plant's capacity, and the further loads up to combined capacity of both plants.



46 K. W. Twin Unit Switchboard installation for 12 K. W. service. The upper half of center panel is the "Paralleling" part of the board

Switchboard used on two 110 volt, 6 K. W. units installed on the Loeb Farms, Charlevoix, Michigan. These plants supply current for a large household, with many servants, and operate large water system, several motors, including one 3 H. P. motor, and also charge batteries for an electric launch used on the lake.

The large number of switches on the center panel are special and control circuits to the various buildings of the estate. We built the board and build similar boards for various customers.

THERE IS A MATTHEWS ELECTRIC LIGHT AND POWER PLANT FOR EVERY PURPOSE

Full Automatic Control Insures Longest Battery Life—Least Operating Cost

For long life and economical usefulness a storage battery requires:

1. Charging at the right time.
2. Charging at the right rate.
3. Protection against too high a discharge rate, or overload.

Neglect any one of these considerations and battery life is shortened.

The Matthews *full-automatic* control insures longest battery life because it automatically charges battery at the right time, at the right rate, and automatically starts the engine and generator, whenever the discharge rate exceeds normal.

Full-Automatic control eliminates human forgetfulness, oversight or carelessness toward the storage battery.

Experienced users and buyers of lighting plants are not deceived now, by claims that a plant is supplied with a large or oversize battery. They know that the *right* size battery is the *smallest* size that will supply all the current needed by one to fifteen or twenty lights without being overloaded. Owners of such batteries find they last from six to eight years, if they are not charged too rapidly, if not overcharged, and also if not used for very heavy loads, without assistance from generator.

Batteries consist of 16 cells for 32 volt plants and 56 cells for 110 volt plants.

All battery ratings in this book are based on "continuous discharge" rating as approved by the Society of Electrical Engineers.

Connecting straps are long and permit various spacing and arrangement of the cells to suit individual locations.

80 ampere hour glass jar battery can be put in space totaling 73 inches long, 14 inches high and 8 inches wide. For places where extreme space economy is required, a rubber jar battery can be used. 80 ampere hour rubber jar battery is in two cases, each $7\frac{1}{2}$ " x 20" x 12" high, and weighs 300 pounds.

Full Automatic control never forgets.

The Matthews Electrical Governor prevents a too high rate of charging battery. All experienced electric plant owners now insist on having a *governor* on their plants.

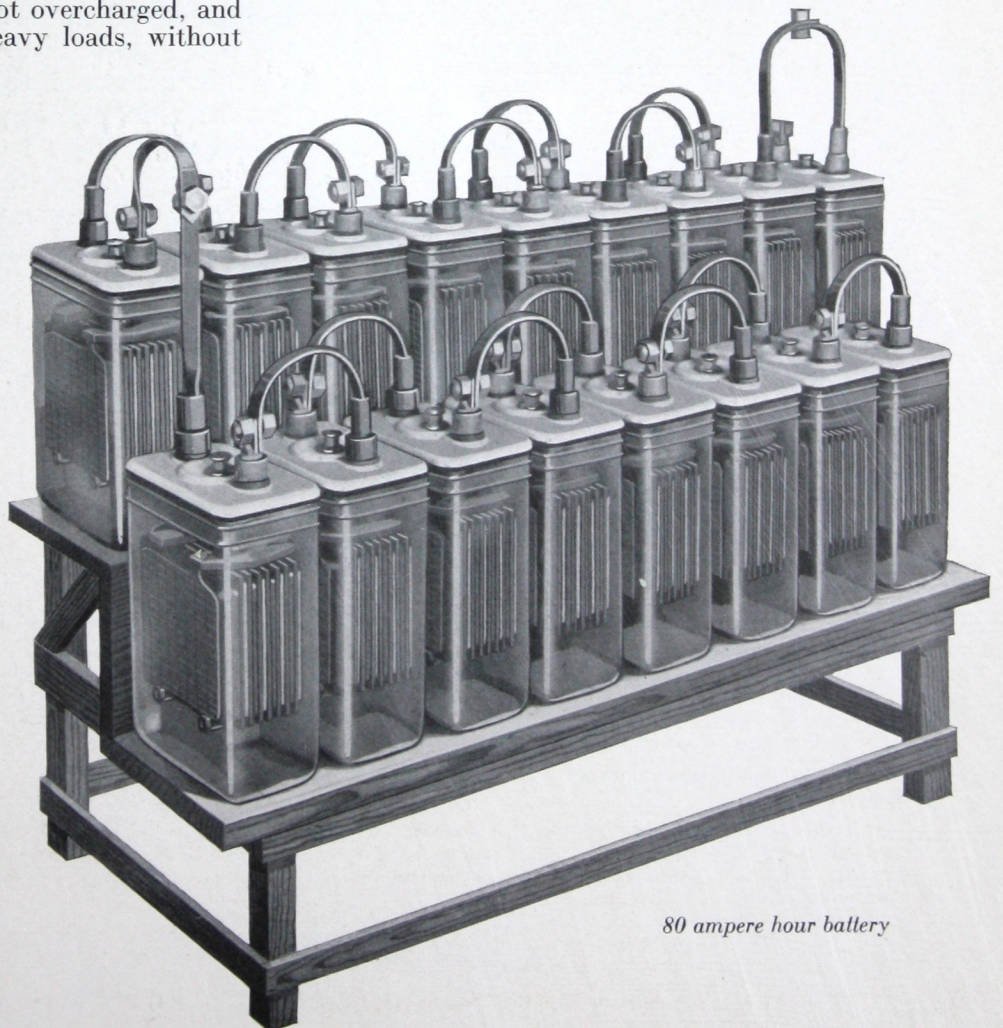
Economy

Electric plant economy depends upon:

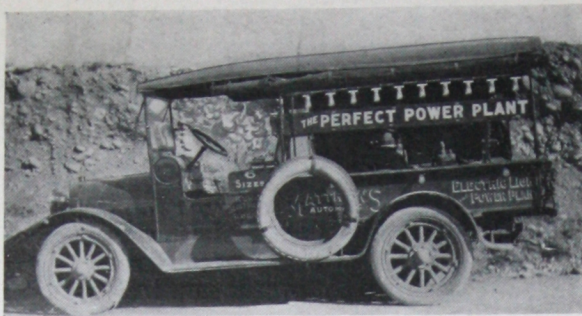
1. Expense for fuel.
2. Ultimate cost of battery replacement.

Full-Automatic control reduces fuel expense because all heavy loads are taken direct from generator. A large percentage of all current put into a battery is lost and the saving in fuel alone used in heating a flat iron direct from generator instead of from battery is approximately 40-50%. This is a direct saving without considering lengthened battery life.

Owners of Matthews light and power plants state their plants will last well into the second generation. During that time their battery replacement costs will be from 50 to 70% less than if they had not full-automatic control to increase battery life and eliminate repair expense.



80 ampere hour battery



*There is 'a Matthews demonstrating wagon in your vicinity.
Let it give you a free trial of electricity in your home,
without obligation.*

WHEN you buy a Matthews *Full-Automatic* Light and Power Plant, you buy electric service and not a machine. Please remember, that, as you look back over this catalog, we can furnish you in your own home with the same comfort and enjoyment you see in this book, and with the same reliability in your own home that we gave the Government in the plants that protected the lives of the soldiers at sea, and supplied current for the entertainment huts and trenches abroad. While we have gone into descriptions of mechanical details to a considerable extent in this catalog for the benefit of those who want to know, nevertheless you can operate your Matthews plant year after year with little knowledge of the plant beyond supplying it with gasoline, oil and water.

MATTHEWS ENGINEERING COMPANY

Manufacturers

Sandusky, Ohio, U. S. A.



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CCA



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